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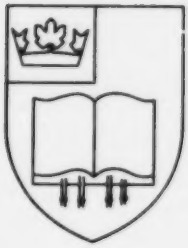

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Presidential Address
Allocution du Président

ALEXANDER G. McKAY, F.R.S.C.*

Can Poets Move Mountains? Reflections on the "Two Cultures"†

LORD SNOW'S celebrated dicta on the "two cultures" have been studied, rejected, extolled, and reviled many times over since their first utterance. For some the separated twins are mere museum exhibits, mummified memorials of a hardly novel perception of the recent past. Few would question that one "does" science and the arts in different ways, but there is nevertheless a residual anxiety about the artificiality of the self-imposed barrier between the scientist and the artist or humanist. Werner Heisenberg in the seventies emphasized the humanistic milieu in which he and other scientists like Bohr, Planck, Fermi, and Einstein evolved the physics that has so deeply affected our lives.[1] Roger Williams appealed for a close relation between biology and behavioural science by arguing that, from a biological standpoint, "the recognition of the uniqueness of human minds is essential to human understanding."[2] Loren Eisley, another champion of the ties between science and the humanities, fits, as well as any person I have ever known, the definition of a modern Renaissance man, one who has broad interests and has been able in a number of areas to develop his knowledge well beyond the superficial. Both scientist and humanist, he found a medium for expression of each capacity that denies the individuality of neither and demonstrates that there is no mutual exclusion in either. His literary competence was of the highest order, his scientific accomplishment matched it, and his books combined the two admirably. His whole career was academic, and yet he managed to talk of the ordinary

* Department of Classics, McMaster University.
† Presidential Address / Allocution du président, 2 June, 1987.

1 Werner Heisenberg, *Physics and Beyond: Encounters and Conversations*, trans. A.J. Pomerans (New York, 1970).
2 "The Biology of Behavior," *Saturday Review*, 54 (30 January, 1971), 18.

experience of growing up and wondering about nature and people in terms that combine philosophical and anthropological depth with poetic beauty.[3] I dwell on Loren Eisley because he demonstrates in his own personal achievement and in his intellectual qualities what I believe we should have in our educational thinking and in the exercises of our national academy: the retreat from the exclusiveness of specialization into the more productive climate wherein the specialist recognizes his responsibility to the general needs of society and works towards the reuniting of the disciplines to that end.

Lord Snow and F.R. Leavis waged a brisk but vehement war over the "Two Cultures." Sir Kenneth Dover, in his presidential address to the British Academy in 1981, recalled Lord Snow's surprise and dismay over the conflict, a mud-slinging match which reawakened his deep suspicion that the humanities were "an intellectual slum."[4] Although Sir Kenneth sought to amend and enlarge the continuing debate by adding a "third culture" that embraces the creators of works of art, literature, and music, he was short-circuited in his argument by the brevity of his paper. However, for our purposes, he did draw an essential distinction between the activity of posing and answering questions, whether in the sciences or humanities, about what is already there, and the creativity of the artist whose "temperament" is an inclination to accept a view of the past or of the universe not because it can be sustained by evidence, but "because it evokes a welcome aesthetic or emotional response."

Does Sir Kenneth's "third" culture contribute towards a reconciliation between the humanities and science? Or is there a sly attempt here to disguise the humanities as science? Let me revert to the nineteenth century for a moment, to a poet and a clergyman nestled in the comfortable if somewhat stuffy embrace of the Victorian era. The Reverend Francis Kilvert, whose diary was edited by William Plomer, relates an entertaining event involving George Venables' personal encounter with William Wordsworth:

> One evening riding near Rydal I saw Wordsworth sauntering towards me wearing a shade over his eyes, which were weak, and crooning out aloud some lines of a poem which he was composing. I stopped to avoid splashing him and apologized for having intruded upon him. He said: "I am glad that I met you for I want to consult you about some lines I am composing in which I want to make the shadow of Etna fall across Syracuse, the mountain being 40 miles from the city. Would this be possible?" I replied that there was nothing in the distance to prevent the shadow of the mountain falling across the city. The only difficulty was that Etna is exactly North of Syracuse. "Surely," said Wordsworth, "it is a little N.E. or N.W." And as he was evidently determined to make the shadow fall the way he wanted it I did not contradict him.

3 See, for example, Loren Eisley, *The Unexpected Universe* (New York, 1969).

4 Presidential Address (2 July, 1981), *Proceedings of the British Academy*, 67 (1981), 77–82. Lord Snow's remark, "on a comparatively informal occasion," appears on p. 81.

Wordsworth stood firm and the poem survives as evidence of his shady resolve.[5]

So, poets can move mountains! But what is the use of a literary education founded on such misconceptions as Wordsworth's? Surely there are more patently useful things for students to do in a university . . . like becoming qualified engineers or geologists? Wordsworth's lines certainly provide a measure of aesthetic pleasure, a comical relief perhaps for the hard-pressed student. Is that an acceptable "use" for literature? Are university professors of English, and of literature in languages other than English, mere purveyors of pleasure, surreptitious hedonists, clandestine Epicureans masquerading as earnest seekers after knowledge?

Certainly I would not hesitate to champion the pleasurable values of the humanities. Too often, in my experience as classicist, the humanities are pursued as inhumanely as the most arid technology. From the late nineteenth century on the ideal of scientific objectivity has bedevilled our discipline and had harmful effects on its nature and its aims. With the unexampled prestige of the sciences before them interpreters have sought to analyze texts rather than respond to them. In an age when the individual is increasingly unsure of himself, we distrust personal insight and prefer the antiseptic impersonality of data into which value judgments do not enter.

Classicists concerned with the necessary historical and philological exactitude can too easily ignore the larger human relevance of their texts. Preoccupied with the accuracy of details, they become fearful of broad meanings. They prefer the safer course of the provable particular over the risky venture of the unprovable generalization, though without generalization particulars are meaningless. Some of our professional circles tend to label such concerns "sentimental" and to regard purely technical research as the only "solid" contribution to classical studies and the only proper activity for the classicist. And so the means threaten to engulf the end. Spirit, imagination, and intuition are sacrificed to fact and methodology, and students are presented with ashes where they looked for bread. Research and contemplation must go hand in hand: the classics must not be seen as reservoirs of intricate philological problems waiting to be solved but as visions "hung vast before my mind / with half-unravelled web."[6]

Public opinion tends to associate the sciences with inquiry, discovery, and communicable reasoning, the humanities with learning, transmission of an inheritance, and intuitive, arbitrary, private judgment. Inquiry, discovery, and reasoning are obviously not the exclusive preserve of the sciences. At the same

5 For the quotation see William Plomer, ed., *Kilvert's Diary: Selections from the Diary of the Rev. Francis Kilvert* (London, 1961), vol. I, pp. 234–5. Wordsworth's *The Prelude* offers the following: "Where Etna, over hill and valley casts / His shadow stretching towards Syracuse" (Bk. XI, ll. 377–8).

6 John Keats, *The Fall of Hyperion: A Dream* (1819), canto I, ll. 307–8.

time, as humanists, we cannot allow the text to remain at the cold remove of scientific objectivity. The proper function of texts, in the received or nascent tradition, is to enlarge and recreate the life of the spirit, to open the mind to wider horizons, to refine the sensitivity to the complexity of the human tradition and its expression in art. To do so humanists have to bridge the gap between their professional and their personal lives. An individual's collective work cannot rise to a higher level than his personal scale of values.

The chief function of the humanities is to minister to people who want to grow up intellectually, to know more and to see more clearly than when they started, to have the mind of an adult rather than that of an adolescent, a trained poodle, a slave, or a slave driver. Sometimes the courses of science and humanity may overlap: a seeker after knowledge may discover useful skills, and the quest for gainful employment may yield knowledge that will help him to grow up as well as grow fat. The ends of science and of the humanities are the same: to humanize the individual, to get him out of the zoo, and to prevent his collapse into the trap of mechanization. Thought and imagination are fundamental to both: to know more and to think better, with the utmost freedom, is their common objective.

Procedures, of course, are distinct and different. The discovery and formulation of general laws govern the natural, biological, and social sciences. Laws may be susceptible to change, or amendment; troubling contradictions may surface, along with exceptions, and problems of jurisdiction; and instead of absolute laws there may be another kind of regularity called probabilities or correspondences. But the idea of rule, of regular sequence, the relations of phenomena, the quantitative norm, or the defining curve are inescapable. The humanist's procedures are different: they are not concerned with the discovery or formulation of laws but with individual insight, thought, and creative imagination. Humanists are not, generally speaking, discoverers of laws. They lean towards inspiration, insight, and conjecture, none of which is to be regarded as law or as in any sense binding on other humanists.

Science proves, the humanities persuade. Rational argument, and evidence, experimental or statistical, are basic to scientific conclusions; the humanities proceed by hunches, dreams, sometimes fantasy. *Quod erat demonstrandum* is the scientist's conclusion; the humanist is satisfied with "This is the way I see it." Where science predicts, the humanist is satisfied with the present: "This is the way man looks to me at this present. This is the way things look now. This is the way they feel now." History is something of an exception in the humane fold: it balances precariously between science and the humanities, bound to tell what happened, longing to tell what must happen, dedicated to disintegrating dreams about the past but now and then tilting towards prophecy about things to come.

We are all aware that education has become over-compartmentalized, that these separations, though potentially valuable for the isolation of fact and the securing of technological advance, run the risk of failing the student and the

society that he represents, by neglecting the reintegration of knowledge thus achieved for the individual and the social welfare. There have been fitful, all too infrequent attempts in our universities and colleges to forge a unity between science and the humanities, to achieve again something of the common sense that kept them together in antiquity. I suspect that the preference shown for the social and behavioural sciences by today's undergraduates reflects not the joy they find in quantified data but their belief that these areas of study are humane in the best sense of the word and that they have the ultimate interest of individual man and social man as their purpose.

What should the humanities offer? Insight, I suppose, into a variety of social conditions, human situations, and emotional imbroglios that we may never encounter in our own lives. The best samples offer us constants of human nature with a clarity and vigour that ensure their futures. They have a reality and an exemplary character that provide insight into reality. I am reminded that about the same time that Harvey was demonstrating the circulation of blood, Shakespeare was fashioning his imaginary Prince Hamlet; that about the same time that Newton was formulating the laws of gravity, Milton was designing fantastic deeds for his mythological demon, Satan. Hamlet and Satan, though imaginary beings, are somehow just as meaningful and powerful as the demonstrated laws of Harvey and Newton. They are the creations of exceptional individuals who were able to see more than the rest of us, more widely, more deeply, more freshly. The humanities are the sum total of the efforts of gifted individuals to look directly at this world and at life and so provide us with new insights into reality. Insight, vision, and revelation are the traditional images we use to define their essential genius.

The range of vision varies considerably among literary artists: breadth and diversity in Chaucer, Shakespeare, Dickens, and Tolstoy, fantasy in Swift and Kafka. Some, like Molière and Jane Austen, fasten on our inner inconsistencies and self-deceptions; others, like Boccaccio and Byron, picture our follies as contemptible. Sophocles dramatizes the disastrous conflict of aspiration and impulse in *Oedipus Tyrannos*; Ibsen senses the disastrous conflict of idea and impulse. Cervantes sees ideas as both comic and noble; Dante highlights all the vices that man can practise, all the excellences of which he is capable, and arranges them in a ranking order. The inescapable fact of good and evil can be conjured in terms of a strange, expansive, extravagant myth by Milton, or Goethe, or maybe even by Tolkien. As Pogo would have it, "We have met the enemy and he is us."

The greatest literature serves no party save that of our common humanity. It spreads before us the autobiography of mankind, a library of human situations, and an endless repertory of encounters. We are brought face to face with all that we have been and much that we may be. The freedom of the visionary faculty of our writers, past and present, needs our constant care and vigilance. Literature is created out of personal vision. It offers us, in its classic assembly, the entire range of human diversity; the worlds of Shakespeare and Montaigne, Keats and

Hopkins, Melville and Dostoevsky, Sterne and T.S. Eliot are worlds of unique, dissimilar individuals, worlds of extraordinary and glittering variety. We learn from their imaginings just how incomprehensible, wavering, and misty our fellow creatures are. Homer, Sophocles, Euripides, and Vergil are all much concerned with public themes. They celebrate in different ways the achievements of their respective societies, but they all refuse to allow the public world to annihilate the individual or to outweigh the incalculable worth of his suffering. The Greek and Roman classics help us to remember the fundamental value of human existence; they keep open access to images of heroic aspiration, nobility, courage, joy in a world of pain and uncertainty. What can *Oedipus Tyrannos* or the *Aeneid* provide for us today? The opportunity to put ourselves in the place of another, and of many others, where the pains and the pleasures of the species become our own.

This vast canvas of the human condition is not, like a scientific conclusion, verifiable. We cannot run experiments, or computations, or apply it under controlled conditions, and thus be assured that what authors tell us is true. Yet in a sense it can be verified; it is verified by posterity. It lives because for generation after generation it has been found to correspond to something actual in the human being and in the human experience. It provides us with something like knowledge, not the kind of knowledge offered by laws, formulae, or propositions but the knowledge that derives from experience itself. The humanities lie somewhere between laws and general experience; they are concerned with more inclusive, disorderly, less manageable chunks of reality than is science. Literature sets a frame, imposes a form, and provides a perspective on reality that we cannot hope to find in our ordinary individual lives.

The joy and the use of literature is that it enables us, as Gertrude Stein expressed it in her *Four Saints in Three Acts*, "to live half inside, and half outside of doors." We are both observers and actors. We are involved in the experience of epics and novels, not as actual participants but as imaginative participants. That is part of the fascination of mystery novels, of works by Agatha Christie and P.D. James and by our Canadian mystery writers Eric Wright and Howard Engel. They too expand and enlarge experience for us by confronting us with many kinds of action, feelings, and thoughts that our daily chaotic lives might never reveal to us, though they are, in their way, natural to us and to human life. They let us expand humanity into a larger range of possibilities, evil as well as good.

How does the foregoing parade of authors and insights conform with my earlier assertion that the humanities and sciences have common ends and uses? I have already suggested that humanists should not succumb to feeble imitation of either the methods or the aims appropriate to the natural sciences, although some of our aims are, of course, identical. Humanists must not be ashamed to learn from the sciences in the right place and to make use of the methods they can teach us, where these are pertinent, or to apply techniques and apparatus

which they have made available to us. As humanists we should not pretend, even though we, too, have our frontiers of knowledge, that these are comparable to those in physics or in medicine, or that work at these frontiers should always take precedence over the fresh interpretation and evaluation of more familiar ground, a task which is necessary in every generation and particularly so in the humanities. Isolation and exclusion are unacceptable: we must allow the new horizons in the physical and social sciences, in the arts and technology, to enlighten and excite us. First and foremost, humanists have to trust in instinct and intuition, factors which are certainly not wanting in our scientists today, or at any time.

I have not been particularly overjoyed by the recent discovery in the Bodleian at Oxford of the innocuous verses which some have assigned to Shakespeare:

> Shall I die? Shall I fly,
> Lovers' baits and deceits,
> Sorrow breeding?
> Shall I tend? Shall I send?
> Shall I sue, and not rue
> My proceeding?

Your own reactions to the foregoing lines are as acceptable as anyone's if you have a sure-footed acquaintance with Shakespearean poetry and seventeenth-century conventions. Shy, "anonymous" passages like this fished out of Shakespeare's least popular plays would probably excite a tournament of arguments pro and con the Bard of Avon's authorship. Finally, the only resort would be to instinct, the subtle witness of the ear. These verses, in a volume dated 1630, replete with internal rhymes and banalities, sound like the work of a lesser song-writer who wrote either too much or too little. I cite the lines because they call into play the sensory apparatus of the humanist faced by a problem of authorship.

I started this "strange eventful history" with Wordsworth and the inaccurate orientation of Mount Etna in the service of poetry. I have tried to measure the two major components of our Royal Society in terms which are appropriate to this specialist in literature albeit of the past track. How do all my remarks and measurings relate to our national academy of arts and sciences? Will my remarks help us to respond brightly and righteously to the perennial question: "What purpose does the Royal Society serve?"

I took note of Jean d'Ormesson's response to that question in some desultory reading a while ago. One-time chairman of the board of *Le Figaro* and now chancelier de l'Académie française, d'Ormesson offered the following:

> "What purposes the Academy?" is one of those recurrent questions posed by imbeciles when they exhaust the charms of the weather . . . . What purpose? *Mais*, none, like all delicious and somewhat great things. What purpose cats, the Temple of Abu Simbel, the

islands of the Italian lakes, the flame roses of the Camargue, military parades, and the strutting of animals, who wish to dazzle their conquests, the very old oaks of the fields, our memories of happiness? To the eyes of the world dominated by money, by power in all of its aspects, by collective movements, fleeting, and blind, what purpose the Academy? None at all. Its purpose is to be *beau*.

Count Jean d'Ormesson's response is enchanting, memorable, and apt. My response as president for the past triennium has had to be that of a combatant or collaborationist, most frequently that of an agent provacateur for the aims and objectives of our interdisciplinary community.

For me, the Royal Society of Canada is a natural resource of the highest potential, of boundless significance for us and for Canada. It is the arena where we may, in unison, humanists and scientists alike, anglophone and francophone allied, grapple with issues and with realms that are both inside and outside our domains. Ours is a large task. The marriage of science and the humanities has never been untroubled; it has never been easy. But the union of our three academies is fundamentally blest and entails a great responsibility, for as Fellows of the Royal Society of Canada we must take from each other and give it back to everybody, to our nation, in new, salutary forms. The symposia which we have mounted at McMaster University during this annual meeting are signal examples of the sort of contribution we can make in concert; they are events that will enlarge and enrich the interplay between the Society and the nation. The strengths of our disciplines and our academies are individual and at the same time complementary. My concern today has been to accent the contribution which the humanities can provide to our common enterprise. The poet Archibald MacLeish was deeply concerned about the *knowledge* of the fact in isolation from the *feel* of the fact, about *knowledge* of the human mind divorced from the *comprehension* of the human being. Here are his words, a challenging gobbet from this convocation address at Yale University: "For only when poetry itself—which means all the powers of all the arts—regains its place in the consciousness of mankind will the triumphant civilization the sciences have prepared for us become a civilization in which men can live alive."[7]

7 MacLeish, "Crisis and Poetry," an address to the Yale Alumni Convocation in the Arts and Sciences (7 October, 1960).

Symposium:
AIDS
Colloque:
AIDS

COLIN L. SOSKOLNE*

A Canadian Retrospective on AIDS: Implications for Future Policy, Economics, Behaviour Modification, and Research†

THIS RETROSPECTIVE on AIDS in Canada focuses on the implications that previous action (or inaction) may have for future policy, economics, behaviour modification, and research. It is indeed an honour to be able to reflect on the emerging epidemic that I have been involved with since its beginnings in Canada in 1982. It is a particular honour to be presenting a perspective on AIDS coming from "Western Canada," here in "Central Canada." The basis for this comment will become clear through this presentation.

IN RETROSPECT

AIDS has been a particularly difficult area within which to find oneself immersed, especially for those who had become involved in this problem when the epidemic first was recognized in Canada, in 1982(1). It has been all-consuming, not only because of the unknowns early on in the epidemic but perhaps more because of our inability to convince governments (and the public) to commit resources to assist in dealing effectively with the emerging and burgeoning problem of AIDS. To put this in perspective, I quote Dr. William

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† Presented to the symposium, "AIDS," McMaster University, 1 June, 1987.

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COLIN L. SOSKOLNE*

A Canadian Retrospective on AIDS: Implications for Future Policy, Economics, Behaviour Modification, and Research†

THIS RETROSPECTIVE on AIDS in Canada focuses on the implications that previous action (or inaction) may have for future policy, economics, behaviour modification, and research. It is indeed an honour to be able to reflect on the emerging epidemic that I have been involved with since its beginnings in Canada in 1982. It is a particular honour to be presenting a perspective on AIDS coming from "Western Canada," here in "Central Canada." The basis for this comment will become clear through this presentation.

IN RETROSPECT

AIDS has been a particularly difficult area within which to find oneself immersed, especially for those who had become involved in this problem when the epidemic first was recognized in Canada, in 1982(1). It has been all-consuming, not only because of the unknowns early on in the epidemic but perhaps more because of our inability to convince governments (and the public) to commit resources to assist in dealing effectively with the emerging and burgeoning problem of AIDS. To put this in perspective, I quote Dr. William

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Haseltine of the Harvard School of Medicine on 14, November, 1986, whose sentiments I echo:

> Over the last three or four years, we have seen every one of our worst predictions confirmed. We have, many of us, felt like Cassandra who could see the future, could speak the future, could be listened to, but would not be believed. I think from now on, the facts will speak for themselves. We are seeing the mounting number of AIDS cases in this country and around the world that we anticipated two or three years ago. We are seeing the devastating health effects and the impact on our health care delivery system. Those facts will speak for themselves.

It is only now, over the past few weeks, that the Reagan administration in the United States has acknowledged the subject and seriousness of AIDS, with Mr. Reagan himself mentioning the problem publicly (2–5). In Canada the response at the government level had been marginally more decisive than in the United States; but still, as in the United States (6–10), it remains woefully inadequate. In making this point it is important to distinguish the general excellence of the response of the United States' Public Health Service, its National Institutes of Health, its Centers for Disease Control, the Surgeon General of the United States, and other health professionals there, whose recommendations have so commonly fallen on deaf political ears. Indeed, political interference often has served to divert extremely limited resources into wasteful political battles. For example, the LaRouche Proposition, No. 64, in November 1986, proposed mandatory testing, quarantine, and labelling of infected people (11). We may be thankful that it failed, though at the cost of enormous financial and human resources.

To date the response to AIDS in most regions of the world has been "reactive" rather than planned, co-ordinated, and "pro-active." Reactively, resources mainly have been channelled into the "medical model," to the relative exclusion of the "social sciences." Primary prevention in AIDS will not be solved by the prescriptive, physical sciences approach alone.

As a consequence of continuing neglect—or at best, for a belated piecemeal approach to the problem, I suggest that an escalating price will be paid. Not only will an economic toll be exacted (12–15), but so will a toll in freedom and in social and political order (16–19). The sooner medical and social science recommendations are melded with political policy, the better (20).

Federal, provincial, municipal, and voluntary efforts against AIDS are only beginning to emerge in Canada's health care, education, and social service systems. Across the country, people only now are beginning to recognize the impact that AIDS will have on most segments of our society. In Alberta, for example, the provincial government has just started to *react* to the threat of AIDS. However, much more is needed: *new* monies must be found (6, 7); co-ordinated and planned pro-active medical and social science approaches must be reinforced by political leadership in a nationally unified policy framework.

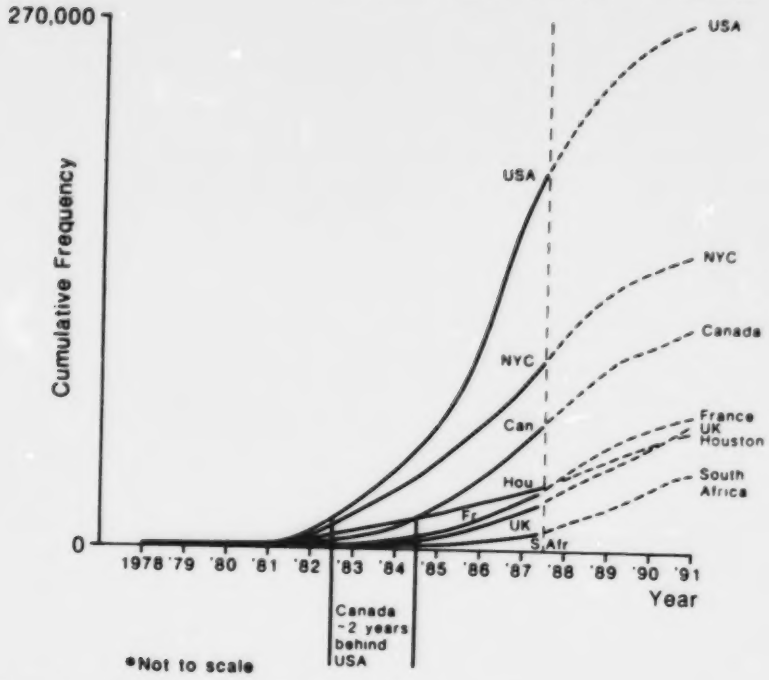

FIGURE 1. Hypothetical AIDS epidemic worldwide: selected regions.

The average direct cost for maintaining a patient with AIDS has been estimated at about $40,000 in Canada (21), much less than the approximately $100,000 (U.S.) south of the border (12–15, 22, 23). Dollars spent *now* on prevention and education are essential for minimizing the future projected economic impact of this epidemic on our health care system (6, 7). Legal, ethical, social, and political repercussions also may be minimized through preventive efforts started today (2, 6, 7, 9, 16, 18, 23–29). Each passing day sees the expansion of the human reservoir of virus (23, 29, 30), reducing steadily the potential effectiveness of any possible future interventions. Albeit belatedly, start we must, for it is not possible to recover those opportunities already lost through inaction (31).

In the AIDS epidemic, where does Canada stand? Figure 1 displays hypothetically the AIDS epidemic world-wide, based on the emergence of the epidemic in selected centres and countries. Canada ranks second only to the United States in terms of the cumulative number of affected individuals in the population among all developed countries. The fanning out effect shown in Figure 1 is typical of a propagated epidemic having time-delayed geographically distinct epicentres.

TABLE 1
AIDS in Canada and Alberta: cumulative frequencies by date of diagnosis

Date of diagnosis[1]	Cumulative frequencies[2]		
	Canada[3]	Alberta[4]	Edmonton[5]
1979	1	–	–
1980	4	–	–
1981	10	–	–
1982	32	–	–
1983 Jan–June	61	1	–
July–Dec	85	3	–
1984 Jan–June	146	7	–
July–Dec	226	13	2
1985 Jan–June	359	19	3
July–Dec	540	30	5
1986 Jan–June	745	37	7
July–Dec	985	49	13
1987 Jan–June	1,194	70	23

1 Annually from 1979 through 1983; bi-annually from 1983.
2 As on 20 July, 1987, and subject to change as new cases are reported to the Alberta Department of Community and Occupational Health and to the Laboratory Centre for Disease Control, Ottawa.
3 Canada's cumulative rate = 47.2/million.
4 Alberta's cumulative rate = 29.4/million.
5 Edmonton's cumulative rate = 35.4/million.

Table 1 displays the cumulative frequency of reported AIDS cases in Canada by period of diagnosis. The geometric progression in the data is clear. Today in Canada there are on average one to two new cases of AIDS reported each day, in comparison with the United States, which is reporting an average of approximately forty-six cases daily. Given that Canada contains a population that is about one-tenth that of the United States, and that Canada lies approximately two years behind the United States in terms of its phase on the epidemic curve, it is clear that Canada is following closely the course of the epidemic in the United States. The approximately two-year lag can be demonstrated by another comparison: at the end of May 1987 the attack rate per one million population in the United States was approximately 156 per million population, the Canadian rate approximately 41 per million population. The United States experienced this Canadian rate in April 1985, two years and two months earlier.

In 1983 in Toronto certain social and logistical questions concerning AIDS were being asked: 1) How do governments respond to a health problem / a

crisis / an epidemic? 2) Can the scientific community be mobilized? 3) Are medical health personnel adhering to Hippocratic oath principles? 4) What is the impact of privacy, ethics, and confidentiality on research? 5) What influences do the media and peer review have on the ability to conduct AIDS research?

Decisive action on the problem of AIDS has been seen to lack political will in Canada, perhaps paralleling the pattern in the United States. Early in the epidemic the scientific community could not be mobilized. Physicians tended to guard jealously their patient populations in order to protect their own potential to publish in pursuit of academic kudos. We have seen a disregard for the Hippocratic oath from health professionals over the duration of the AIDS epidemic to date (32), out of fear of homosexuality and fear of the virus. Questions of privacy, ethics, and confidentiality have constrained our ability to do research, particularly in terms of age limitations in recruiting subjects to epidemiological investigations, and in the lack of legislative safeguards to protect the rights of potential subjects; personal details that could be incriminating are needed for the successful conduct of epidemiologic research for understanding modes of transmission in particular. The need for public health education has sometimes had an adverse impact on the peer-review process in grant applications and in seeking funding support, as conflicts of interest emerged.

There have been soothsayers and doomsayers in the epidemic of AIDS. For example, in August 1983, from New York City came a question of whether the epidemic might be levelling off. Such hypotheses, made by people in the public health sector (8), perhaps because of a lack of resources to cope with the threat, could either have been expressing wishful thinking or, indeed, may have been manifesting conflict of interest. Such views, I suggest, have served to confuse messages to both government and the public and thereby to interfere with the need—early in the epidemic—to ensure adequate funding support for early interventions (31).

In March 1985 the United States had reported an accumulated total of almost 9,000 cases of AIDS, whereas today, just over two years later, there have been over 36,000 cases. This escalation underscores that the epidemic is of a slow virus nature, with a long incubation period that could exceed fourteen years and averages perhaps two to seven years (29). Each case of AIDS represents only an end-stage manifestation resulting from infection with the AIDS virus. Each case also represents a person in society who has become ill out of an ever-burgeoning reservoir of infected people. By March 1985 Canada had reported 189 cases of AIDS, whereas two years later Canada has had in excess of 1,034 cases of AIDS. In March 1985 150 new cases of AIDS were being reported each week in the United States, while today there are on average 325 new cases per week. By comparison, in March 1985 there were two new cases of AIDS being reported every three days in Canada; now, as mentioned earlier, there are reports of one to two new cases of AIDS every day.

Today in Canada the doubling time for the accumulated number of AIDS cases is twelve to fourteen months; in Alberta the equivalent period is every sixteen to eighteen months. Within countries, regional disparities must be recognized in developing national strategies.

A STATISTICAL REVIEW

The first Canadian case of AIDS was reported in a homosexual man from Windsor, Ontario (1). Since then the first Canadian case has been diagnosed retroactively to 1979. Since 1982 it has been possible to follow the epidemic's course (33). There had been a total of 1,034 cases of AIDS through 25 May 1987; as in the United States, approximately 50 per cent of these people have died.

British Columbia has the highest cumulative AIDS attack rate in Canada of 75 per million population, with a total of 226 cases reported (through 25 May, 1987). Quebec is second with 45.3 per million population affected and a total of 298 cases; Ontario is third with 41.5 per million population affected and a total of 399 cases; Alberta is fourth with an attack rate of 23.8 per million population and a total of 56 cases; Nova Scotia is fifth with 18.2 per million population affected and a total of 16 cases; Manitoba is sixth with an attack rate of 15.9 per million population and a total of 17 cases; Saskatchewan is seventh with 12.7 per million population affected and a total of 15 cases; New Brunswick is eighth with an attack rate of 8.3 per million population and a total of 6 cases; and Newfoundland is ninth with an attack rate of 1.7 per million population based on only 1 reported case. Neither in Prince Edward Island nor in the Yukon or Northwest Territories had any case of AIDS been reported through 25 May, 1987.

For comparative purposes, consider three dates: 22 November, 1984; 21 August, 1985; and 25 May 1987. Up to each of these dates Ontario had reported respectively an accumulated total of 56, 120, and 399 cases of AIDS; Quebec had reported 53, 84, and 298 cases; British Columbia had reported 28, 54, and 226; Alberta 8, 10, and 56; Nova Scotia 3, 6, and 16; Saskatchewan 1, 1, and 15; Manitoba 1, 1, and 17; and Newfoundland 1, 1, and 1, for Canadian totals of 151, 277, and 1,034 cases respectively.

Much akin to experience in the United States, approximately 90 per cent of all cases of AIDS in Canada have occurred in people under the age of 50 years, with the modal age category being the fourth decade of life (that is, 30 to 39 years of age).

Seventy-three per cent of AIDS cases have been born in Canada; 7.6 per cent were born in Haiti; 14 per cent were born in other countries; and in 5 per cent the country of birth could not be established.

Unlike the United States, Canada has 82.1 per cent of its cases falling into the homosexual/bisexual male category. Very different from experience in the United States and in Italy, Scotland, Portugal, and other countries is that in Canada 0.4 of 1 per cent of cases (that is, 4 individuals) have occurred among intravenous drug abusers. This distinction has been attributed to the availability

in Canada, unlike the United States, of sterile needles over the counter, without prescription. It should be noted that 28 of 850 homosexual / bisexual men also have reported the use of intravenous drugs in Canada. In Canada, 4 per cent of all cases have occurred among recipients of blood or blood products. Furthermore, 2.6 per cent (26 people) of the afflicted were heterosexual partners of high-risk individuals; 6.5 per cent (65 people) are from a region of the world where the disease is endemic, and for 2.7 per cent (28 people) among the adult groups there is inadequate information for categorization. There have been 19 paediatric cases of AIDS in Canada; 12 of these have been children aged 1 to 14 years; 7, infants under 12 months of age.

EARLY RESPONSES TO AIDS IN CANADA

Time being limited, the following review is necessarily incomplete. One source (34) has been helpful in outlining the Canadian response to AIDS and another in assessing specifically the research response to AIDS (35).

The first major event by way of a co-ordinated activity in Canada was the formation by a Vancouver group of the Vancouver Lymphadenopathy-AIDS Study, which succeeded in inducting 726 homosexual men from six private practices in the Vancouver area. That study began its prospective induction and follow-up of these individuals in November of 1982. Little or none of such activity had been going on in other parts of Canada at that time.

As Dr. Davey has indicated, the Canadian Red Cross Society Blood Transfusion Service (BTS) had first become involved in the study of AIDS in July of 1982. By 13 October, 1982, the BTS had been in communication with the Laboratory Centre for Disease Control in Ottawa over the problem. By 2 December, 1982, personnel from the BTS, the Haemophilia Society, the Laboratory Centre for Disease Control, the National Health Research and Development Program, the Ontario Ministry of Health, the University of Toronto, and the Ontario Cancer Treatment and Research Foundation (the author) had formed an ad hoc AIDS group to discuss funding for AIDS research (36).

By May 1983 the then minister of Health, the Honourable Monique Bégin, had authorized the establishment of a National Task Force on AIDS through the Laboratory Centre for Disease Control, Ottawa. In the summer of 1983 the Medical Research Council funded Dr. Phil Gold's proposed national haemophilia study out of Montreal. By the fall of 1983 the Ontario Provincial Advisory Committee on AIDS had been established, and by September of 1983 the National Task Force on AIDS had been transformed into a National Advisory Committee on AIDS. This committee comprised 16 positions, filled exclusively with physician-trained experts, except for one Ph.D.-trained epidemiologist (the author). By 1984 two community-based groups had established themselves, one in Toronto (the AIDS Committee of Toronto), and one in Vancouver (AIDS Vancouver).

For the 1983 / 1984 period of operation of the National Advisory Committee

on AIDS, the Treasury Branch of the federal government had allocated $1.49 million *over four years*, which expenditures had included two National Advisory Committee meetings in Ottawa, funding to the reference laboratory of the Laboratory Centre for Disease Control in Ottawa, a *Canada Diseases Weekly Report* special supplement to the *Medical Post*, and a pamphlet for the general public on the subject of AIDS. Selected research grants were made available to groups in Montreal, cell-sorter rentals were paid for a number of laboratories, and some conference support was provided.

The National Advisory Committee on AIDS has subsequently produced, through the *Canada Diseases Weekly Report* as well as through special supplements in the *Medical Post* (once a year), information directed at health care professionals.

MORE RECENT CANADIAN REACTION

On 1 May, 1986, the minister of National Health and Welfare Canada announced a *five-year, $39 million* plan for AIDS in Canada. This plan was recommended as the result of a parliamentary standing committee under the chairmanship of Dr. Bruce Halliday, M.P. for Oxford, Ontario (37). It is important to recognize that witnesses who were invited to provide evidence to the parliamentary standing committee came exclusively from the Montreal, Toronto, and Ottawa area, with only a single witness (one lay-group representative) from Vancouver. In my opinion this decision represented a tragic error of omission or commission. For, to this day, the federal perception of AIDS, in terms of funding allocations, is that it is a problem generally specific to Montreal, Ottawa, Toronto, and Vancouver.

I stated in my introduction that it is an honour to be here from Edmonton, presenting information on the subject of AIDS. Notwithstanding the fact that I have been in Edmonton for only two years after moving from Toronto, I am pleased to have an opportunity to register protest at the neglect that such a narrow-sighted policy accords low-prevalence regions which could have provided, in particular, relatively fertile opportunities for primary prevention interventions / demonstration programs, as well as basic science (virologic) research.

The terms of reference for the National Advisory Committee on AIDS (NAC-AIDS) included the mandate "to review the status of AIDS in Canada and in other countries and to make recommendations to the Minister of Health and other appropriate agencies which will lead to implementation of medical care, research and other strategies with regards to the diagnoses, treatment, control and prevention of AIDS in Canada." NAC-AIDS had established five subcommittees: 1) Epidemiology and public health; 2) Communications; 3) Laboratory; 4) Clinical; and 5) Research. Under the new five-year plan, the Research Subcommittee of NAC-AIDS was designated the task of participating in the research review process. Appeals and recommendations for the inclusion of

community group representatives on the national committee were rejected on the grounds that NAC-AIDS wished to remain a technically specialized group. Besides, funding was inadequate to expand the Committee.

The surveillance of AIDS across Canada is encouraged through the NAC-AIDS by way of recommendations to the provinces. As a result, AIDS by law is reportable in British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, New Brunswick, Nova Scotia, and Prince Edward Island. In addition, in Manitoba, Ontario, and Nova Scotia, sero-positivity for human immunodeficiency virus antibody also is reportable. AIDS is not reportable in Newfoundland, the Yukon, or the Northwest Territories. In Quebec, a special committee on AIDS reviews all cases and submits reports to Ottawa.

IMPACT ON RESEARCH AND PEER REVIEW

Through June of 1986, AIDS research had been supported by the National Health Research and Development Program, the Medical Research Council, Health and Welfare Canada, and / or provincial ministries of health / agencies (34, 35). Seven studies were funded in the province of Quebec, three in Ontario, and three in British Columbia. Elsewhere, the Red Cross Society BTS supports research regarding the blood supply. More recently, in Alberta, the Alberta Heritage Foundation for Medical Research provided a technology transfer grant to a company involved in the production of thymidine, an ingredient in the new drug called AZT (or Retrovir).

Two major omissions were brought to the attention of the Federal Minister of Health arising from the parliamentary standing committee report on AIDS in Canada. First, the special interests and needs of low HIV-prevalence regions in Canada had not been included for consideration in the report. As a result, opportunities for early primary prevention and research were lost to these regions. Second, health education / promotion expertise was lacking in the development of the document outlining the five-year plan for AIDS in Canada. As a result, the need for education and health promotion was inadequately addressed in the report and hence only tokenly budgeted, as is seen in the slow and ineffective initiation of education programs across the country. In short, a lack of both regional and expert representation has allowed the implementation of a policy framework that, in practice, *precludes* 1) low prevalence regions around Canada, and 2) an effective national public education program.

NAC-AIDS remains a primary channel for all AIDS research grants, a body that is primarily oriented to the medical model. The implications are negative for primary prevention. Education-oriented proposals, for example, would profit more from the reviews of experts in the area of education evaluation. Those criteria that apply to the review of controlled scientific experimentation are not necessarily appropriate in the evaluation of educational programs. This situation is to be regretted especially when it is realized that the only antidote against AIDS is education (primary prevention); high-technology–dependent

solutions, such as a vaccine or a cure, should not be depended upon for the control of AIDS (6, 7, 23, 24, 29, 31).

HIERARCHICAL RESPONSES TO AIDS

There have been various AIDS activities generated at all levels of Canadian society: the federal government has been involved through the Laboratory Centre for Disease Control, the National AIDS Centre, the Canadian Public Health Association (since May 1986), Health and Welfare Canada, the National Health Research and Development Program, and the Medical Research Council. However, no apparent involvement exists within the Social Sciences and Humanities Research Council of Canada. At the provincial level, ministries of health, education, social services, medical care, and hospitals have had to react to the problem of AIDS. At the health district level, boards of health have become involved in the problem. At the community level, AIDS support groups have formed. A unique Interagency Council on AIDS formed in Edmonton. The media have been instrumental in the provision of public service announcements and in informing the public. Other organizations, particularly hospitals, have been occupied with patient care and the development of pastoral care programs.

CREATION OF A NATIONAL AIDS CENTRE

The National AIDS Centre in Ottawa is a unit formed within the Laboratory Centre for Disease Control in May, 1986. It arose as a recommendation from the report "AIDS in Canada" (37). The National AIDS Centre was designed to co-ordinate and facilitate AIDS related activities nationally, to perform a policy support role, and to provide recommendations on funding priorities.

RESEARCH FUNDING ALLOCATIONS

A total of three million federal dollars was made available for AIDS research in the 1986–87 fiscal period. The availability of funding for AIDS research was brought to the attention of researchers across the country initially by soliciting letters of intent. Few letters of intent were anticipated and yet, in fact, approximately 150 were submitted. After review, only 60 were invited to submit proposals and, of course, even fewer ultimately have been funded. Almost all of those known to have been supported were from Quebec and Ontario, with only one or two from the Vancouver area. Only one proposal known to have been supported was invited from Winnipeg and then only after protests were lodged with the federal minister of Health (whose riding is in Manitoba, southeast of Winnipeg). To the best of my knowledge, the prairies and eastern Canadian regions secured none of this research funding. I submit that this anomalous distribution may have arisen not because of the poor quality

of letters of intent or poor proposals from these regions but rather because the terms of reference as provided through the report "AIDS in Canada" for the consideration of research proposals could not accommodate the needs of low-prevalence prairie and eastern regions with an inadequate research budget.

Aside from the above process, the report "AIDS in Canada" ensured that grants would be provided to study hospices and palliative care. The study of legal and ethical studies went to Montreal. Funding was provided to community support groups across the country, to provide services within the community, particularly to AIDS-affected groups.

CANADA'S RESPONSE TO THE NEED FOR EDUCATION

The Canadian Public Health Association (CPHA) received an allotment of approximately *$3.7 million dollars over five years* for public education programs across Canada. Of this allocation, $700,000 was made available for the first year of operation. It is important to consider the seriousness with which the need for education could have been perceived when just $700,000 was allocated in the first year. Some comparisons are in order. The United Kingdom, with less than half the per capita AIDS problem, devoted the equivalent of about CAN $40 million to education in the same fiscal period (38, 39). A second comparison is also enlightening. The government of Canada allocated $12 million to educate the Canadian public about its free-trade initiatives. I suggest that the feeble allocation of dollars for AIDS education in Canada demonstrates 1) the lack of educational expertise invited to provide input to "AIDS in Canada," and 2) the lack of political will to deal with a sensitive problem.

Briefly, for the benefit of those seeking primary sources of information, I should call attention to the existence of NAC-AIDS' annual reports since 1983/84. And more recently, beginning in 1987, the CPHA has produced a periodic newsletter, *The New Facts of Life*, dealing with AIDS education and awareness across Canada.

COMMUNITY SUPPORT GROUPS AND PROVINCIAL RESPONSES TO EDUCATION NEEDS

Various support groups, now numbering 16 across Canada, were initiated through major commitments on the part of the homosexual / bisexual community. These groups were first to produce cognitive information by way of pamphlets, with funding initially provided from within the homosexual community. This information has been directed not only to the homosexual / bisexual community but also to the public at large. To complement these efforts in Ontario, the Ontario Ministry of Health funded the production of a range of pamphlets dealing with separate subjects: 1) Detecting AIDS; 2) AIDS and health care workers; 3) AIDS and the workplace; 4) Women and AIDS; and 5)

World Health Organization
Organisation mondiale de la Santé

Health and Welfare Canada
Santé et Bien-être social Canada

Canadian Public Health Association
Association canadienne de santé publique

OTTAWA CHARTER FOR HEALTH PROMOTION

FIGURE 2.

Information about AIDS. These pamphlets began to become available in 1986, after the establishment of the Ontario Public Education Panel on AIDS. As stated earlier, the province of Alberta recently reacted to the problem of AIDS with the production of a pamphlet and with paid media spots encouraging people to obtain a copy of the pamphlet at local drugstores, health units, or physicians' offices. The demand for pamphlets exceeded expectations.

A FUTURE COURSE

The piecemeal and reactive nature of Canada's response to AIDS has been emphasized in this paper; the medical emphasis on the problem has been highlighted. Now an alternative model is proposed to minimize the impact of AIDS. In 1986, unrelated to AIDS, Health and Welfare Canada, in conjunction

with the World Health Organization and the Canadian Public Health Association (CPHA), developed a model called "The Ottawa Charter for Health Promotion," schematically shown in Figure 2 (40). I propose that AIDS be considered the catalyst for the early implementation of this model, which is based on the notion that health is created and experienced by people within the setting of their everyday lives—where they learn, work, play and love. Health is created by caring for oneself and others, by being able to take decisions and have control over one's life circumstances, and by ensuring that the society within which one lives allows the attainment of health by all of its members.

Caring, holism, and ecology are essential issues in developing strategies for health promotion. Therefore, those involved should take as a guiding principle that in each phase of the planning, implementation, and evaluation of health promotion activities, women and men should become equal partners. The Ottawa Charter commitment to health promotion received a pledge from participants at its conference held in Ottawa in 1986 1) to move into the arena of healthy public policy, and to advocate a clear political commitment to health and equity in all sectors; 2) to counteract the pressures towards harmful products, resource depletion, unhealthy living conditions and environments, and bad nutrition; and to focus attention on public health issues such as pollution, occupational hazards, housing, and settlements; 3) to respond to the health gap within and between societies and to tackle the inequities in health produced by the rules and practices of these societies; 4) to acknowledge people as the main health resource; to support and enable them to keep themselves, their families, and friends healthy through financial and other means, and to accept the community as the essential voice in matters of its health, living conditions, and well-being; 5) to reorient health services and their resources towards the promotion of health; and to share power with other sectors, other disciplines and, most importantly, with people themselves; 6) to recognize health and its maintenance as a major social investment and challenge; and 7) to address the overall ecological issue of our ways of living.

I submit that the adoption of this model will be essential for the effective containment of the spread of the human immunodeficiency virus (HIV)—the causative agent in AIDS—and the containment of health care costs. Some key factors in Figure 2, in terms of controlling the spread of HIV, include the development of personal skills on the part of the community and creating supportive environments through the elimination of alienating and stigmatizing attitudes (some reinforced by legislation) within the general context of a healthy public policy.

THE MEDICAL MODEL VERSUS THE COMMUNITY HEALTH MODEL

Aside from the self-evident distinction of the medical model as one that is disease driven, from the community health model that is health oriented, other major distinctions between the medical model and the community health model

Medical model	Community Health model
Disease driven	Health oriented
Prescriptive	Facilitative
Power resides	Empower / enable
Assumed reponsibility	Shared responsibility
High-technology dependent	Primary prevention approach
Highly professionalized	Lay persons' involvement valued
Accountability—legal obligation	Person monitors own progress and takes corrective action
Physical-sciences dependent	Human-sciences dependent

FIGURE 3. Distinguishing between the "Medical" and "Community Health" models.

are summarized in Figure 3. The medical model is prescriptive, with the patient providing information and the physician prescribing solutions; in contrast, the community health approach is more facilitative. Instead of teaching, it helps people to learn. Under the medical model, the power resides in the person doing the prescribing and little information is shared; the prescriber has the decision-making power, and there is not much community or individual participation in the decision-making process. In contrast, under the community health model, the health care professional performs the role of a facilitator, doing things *with* people, enabling and empowering them to achieve health. Under the medical model, there is an assumed reponsibility, whereas under the public health model the responsibility is shared. Under the medical model, solutions are most frequently high-technology–dependent, whereas under the community health model, the aim is primary prevention. Of course, high-technology developments in the area of health promotion may be helpful in disseminating information and in motivating people to modify their behaviours. The medical model is highly professionalized, whereas in community health, the lay-person's expertise is more valued. People's own perceptions under the medical model are not as valued as they are under the community health model, which combines pyscho-social and physiological information. Under the medical model, the assumption of responsibility induces a passive role for the patient, whereas under the community health model an active role is encouraged in a shared responsibility. There is a test of legal obligation under the medical model for an observed accountability where the doctor's permission is needed in making, or to ratify, all decisions pertaining to his or her patients. Under the community health model, all people have a role to play in which the individual assumes responsibility for his or her own actions. The person can monitor progress and take corrective action on his or her own.

Many examples that demonstrate actions contrary to the intent of the Ottawa Charter have occurred in relation to AIDS. In Canada, for example, the denial of access by community groups to participate in some way in NAC-AIDS is not consistent with the community health focus of the Ottawa Charter. In the United States, for example, on 30 May, 1987, it was reported (41) that President

Reagan was to form a special presidential commission to study AIDS, but had yet to appoint panel members. However, White House officials have said they would oppose an appointment based on sexual preference. In commenting on this refusal, the only avowed homosexual in the U.S. Congress stated that it is "equivalent to having a holocaust memorial without a Jew on it." Such insensitive action on the part of the president of the United States would be diametrically opposed to the concept of the Ottawa Charter, which implies the involvement of all sectors in a multi-strategy approach to achieve health for all.

The medical model for which President Reagan's aides are displaying a mania may be analogous to the structure of the Canadian NAC-AIDS. Or is it homophobia? Let us never forget, first, the early responsibility of the homosexual / bisexual community in educating its members and in participating in research studies. They are the unsung heroes (42) amid a terrible inexorable plague in their community who share intimacies and allow themselves to be examined and studied at repeated and regular intervals over long periods of time. Without the data gleaned from these studies, much information would be lacking on the question of modes of transmission and risk factors concerning AIDS. Second, it is compliance by the homosexual community with the self-deferral appeal of the BTS that provides major assurance for a "safe" blood supply. Perpetuating alienation and stigmatization cannot be expected to result in responsible behaviours. Canada should not follow many of the political examples set south of its border, policies perhaps motivated by genocidal inclinations on the part of some extreme fringe members of the American polity that have served to immobilize their government and retard urgently needed progress (8, 31). It should be self-evident to the rational observer that such reactions can serve only to harm the majority of Americans. Of course, the negative attitudes towards and blame-laying on homosexuals may continue, but because of the now recognized threat of AIDS within the heterosexual population, an adequate stimulus may exist to infuse the research and education effort with necessary resources. However, negative impacts on efforts to contain the spread of HIV still are likely to prevail as long as the homosexual community remains outside of mainstream society.

In 1984–85, a major effort was launched in Toronto to recruit the sexual contacts of homosexual men with AIDS or an AIDS-related illness into a study of AIDS. To that end, the media was invaluable in providing a supportive environment for the participation of individuals. The multi-sectoral approach implicit in the Ottawa Charter cannot be overstressed.

DISCRIMINATION AND ITS SELF-DESTRUCTIVE TENDENCY

A recent editorial (43) by Last recognized that "homosexuality is not regarded in these enlightened times as a crime or even a psychiatric aberration." Last mentions the very real nature of the love that can exist between homosexuals,

"a love that finds expression in the practice of sexual behaviours that many people disapprove of, or find repungnant." Last states:

> It is these behaviours and their modification that are the issue for the ethicist to consider. Here there are no easy answers. It is easy, of course, to make ex-cathedra statements, and to enclose these in reinforcing phrases that have the authoritative ring of epidemiological knowledge or public health regulations. In many juridictions, we are dealing with legally, and in all jurisdictions, with morally proscribed behaviours. It is easy to allow our feelings to lead us so that our decisions become judgemental to the point of being prejudicial or condemnatory. This attitude, however, would lead quickly to a retreat even further into covert acts among consenting homosexuals, shrouding in even more secrecy the already well-guarded private activities of individuals who are harming no one, and who, in other respects, are members of the same society as the rest of us. It is not possible to change the overall sexual orientation. We have to ask, moreover, whether any good purpose would be served by attempting to change such behaviours among consenting, non-promiscuous homosexuals. The available evidence does, in fact, suggest that even among non-promiscuous homosexuals, a change of partners occurs on the average about once a year; and this can lead, over a 15-year period, to as high a risk of AIDS [virus] transmission as in the most promiscuous homosexuals, whose risk is higher initially, but declines over time as the proportion infected approaches 100 percent. Here, therefore, is epidemiological evidence to support the argument for intervention in the behaviours of homosexual men. The intervention is not gratuitous, but in the best interest of everybody.
>
> A similar line of reasoning applies to efforts directed at altering the sexual behaviour and practices of the heterosexual community, the great majority of people—those at whom the CPHA-produced television messages are aimed. On moral as well as ethical grounds, it is essential to recognize the realities of human sexual behaviour, and to take all necessary steps to ensure that everyone at risk of acquiring AIDS is protected against this risk to the maximum extent possible. It serves no purpose at all to censor television messages advising about condom use, on the grounds that this condones promiscuity. The fatuous illogic of this argument is exceeded only by its hypocrisy. The fact is that a high proportion of people do have intercourse with more than one partner in an extended period of years, and this without being promiscuous. It is essential to ensure that all such people are adequately educated about the risks of AIDS.
>
> If we accept this argument, we can justify on ethical grounds the position that CPHA has taken: wide public dissemination of information about the risks and how to reduce them is absolutely essential. Only the most uncaring and misinformed individuals could think otherwise.

Statements such as these by Last are long overdue in Canadian circles. Clearly, society is going to undergo change as a result of this epidemic, and we should prepare now for the type of society that we wish to see emerge from it. Simplistic solutions, I submit, will result not only in excess morbidity and

mortality in the short-term with continuing social and economic disruption, but also in successive waves of the AIDS epidemic well into the future.

As Last points out, it is hypocritical to deny the reality of the variety of sexual behaviours. Indeed, in a recent article by Klovdahl (44), a large social network structure was described, consisting of five regions, with individuals at three different levels of socio-economic status. The model describes persons in the elite group (high socio-economic status) as being highly interconnected and occupying structurally central positions which serve to maintain social relationships that, in turn, serve as bridges between different social groups. It is these interconnections from high status through middle status and on to low status groups that serve to transmit infectious agents on a global scale, inducing epidemics. Indeed, earlier studies from the Center for Disease Control in Atlanta (44) have demonstrated the social networks that facilitated the sexual transmission of the AIDS virus, showing an index case with other connected cases in Los Angeles and New York, with interconnections to New Jersey, San Francisco, Florida, Pennsylvania, and Texas. Each infected person in turn acts as an epicentre for successive waves of sexually transmissible agents.

THE ROLE OF CENTRAL GOVERNMENT

It is imperative that government take a leadership role on the issue of AIDS. Socially, epidemics involve a predictable human pattern with a macro-sequential response including, successively, denial, hysteria and blame, retrenchment, and accommodation. Government must act to facilitate societal accommodation as effectively and as expeditiously as possible. At an individual level, in the adaptation to a direct threat, Kubler-Ross (45) identified distinct reactions: 1) denial, 2) shock and hysteria, 3) anger and blame, 4) bargaining, 5) depression, and 6) acceptance. People oscillate among these before achieving "acceptance / accommodation"; governments too appear to reflect this behaviour. In Africa, governments denied their AIDS problem until the case-burden, in 1986, made continued denial impossible (46). However, the governments of Great Britain (38, 39, 47), Australia, Sweden (48), and the Netherlands, for example, have responded far more effectively from a public policy and resource allocation primary prevention perspective than either the United States or Canada.

An article in a Los Angeles newspaper asserts: "Epidemics are both medical and social phenomena. Medically, each is unique, involving different germs, with different modes of transmission, prevention and treatment. But socially, they involve a predictable pattern of denial, hysteria, retrenchment, and finally accommodation. Because they are much closer to AIDS than most heterosexuals, many gays have already begun to reach accommodation. Most straights are still in the denial / hysteria stage" (49). Clearly, governments must act to facilitate the needed behaviour change programs.

SUCCESSIVE WAVES OF THE EPIDEMIC

An extension of the doubling time regarding the cumulative number of AIDS cases has been evident since 1983. However, AIDS reports represent the proverbial "tip of the iceberg," with a far greater number of people already infected with the AIDS virus or suffering from AIDS-related illnesses. Therefore, although the incremental rate of AIDS cases may be slowing, HIV-prevalence likely is growing. The development of AIDS itself likely requires trigger factors / co-factors / promotional insults to the immune system, such as reinfection with HIV, infections with other sexually transmitted diseases or with other viruses (26, 29). Therefore, ongoing, reinforcing educational messages to encourage the continuance of those behaviour changes that have occurred within the homosexual community will minimize the extent of recidivism or lapses in these behaviours and also may result in a lower proportion of those infected progressing to AIDS within relatively few years. In the absence of such messages and in the presence of recidivism, successive waves of the AIDS epidemic are likely well into the future. Thus, maintenance of behaviour change is imperative, at least until the trigger factors for the development of AIDS itself are better understood, and a cure or a vaccine is available.

OBSTACLES TO EDUCATION

The problem of education for effective behaviour change (that is, risk reduction) is complex. According to Maslow's hierarchy of basic human needs, first is the homeostatic need for food, water, and air. Seond is the need for safety and security. Third is the need for love and belonging. Fourth is the need for self-esteem. Fifth is the need for self-actualization. Sixth is the need to know and understand; and, seventh is the need for aesthetic expression. Sexual behaviour change means a modification to at least one basic (instinctual) human drive.

Tones (50) reported that "mass media may often have quite dramatic behavioural effects, but these usually occur incidentally rather than as a result of deliberate change attempts . . . . While mass media, if properly structured, produce cognitive change, they are unsuitable for modifying attitudes and changing behaviours."

To quote from a recent editorial by Osborn (28), "in the meantime, we must communicate patiently and clearly to a frightened public what we know and what we are learning. As always happens in times of panic, fringe groups are arising to raise the level of static and make the message hard to hear, and we will have to shout our message of prevention."

Educational efforts need to be directed first at the professional community in the areas of public health, blood workers, technicians and laboratory workers, nursing staff and administrators of hospitals and other institutions such as correctional facilities. Second, the public must be educated, both sexually

active adults and adolescents. Third, established risk groups must be educated. Fourth, special education must be given to infected persons; and fifth, people undeclared as to their risk group, representing the more difficult groups to reach in society, must be educated. This last group might include bisexual men who deny their sexual behaviours. Efforts ultimately must achieve behavioural changes that dramatically reduce the risk of HIV transmission.

FUTURE CASE-LOAD PROJECTIONS

Since 1985, some researchers have attempted to discuss and model (6, 51–66) the AIDS epidemic and some have provided projections through and beyond 1991 (23, 26, 29, 67–74). Using a relatively less complex method, I have attempted to anticipate the number of AIDS cases and the growing number of infected individuals in Canada and in Alberta. The method depends on fewer assumptions and less sophisticated mathematical modelling techniques. It is noteworthy that results obtained by this simpler method are consistent with those derived by others (74).

To project the number of AIDS cases over the foreseeable future, the most valid and reliable projection equation would require a knowledge of the incubation period for AIDS, the annual incidence of seroconversion for HIV, the existing underlying population prevalence of infection with HIV, and the proportion of individuals who are infected that might be expected to develop AIDS per year. Clearly, the annual incidence of seroconversion is a function of duration of infectiousness and efficiency of transmission through behaviour modification adaptations to safer sexual practices. Regardless of the projection method employed, projections should be revised on at least an annual basis as more information becomes available from the ongoing and needed research (particularly in the social sciences) on all those factors incorporated into the projection formula used.

From the more simple approach to projecting the number of AIDS cases, Table 2 provides two sets of estimates for the period May 1987 through May 1998, one more optimistic, but less realistic, than the other which is labelled "current estimates." Given the uncertainties associated with the parameters needed for the equation, projections beyond 1991 likely are extremely unreliable. However, to apply some cross-validation in this modelling approach for estimating the proportions of individuals infected with the AIDS virus, projections beyond 1991 were necessary.

Three successive time periods are presented which differ only in that the doubling times through each of these periods are progressively extended. Thus, the doubling time is the single factor used for the projection equation in this more simple approach to modelling. Assumptions that have been made include: 1) accumulations are equally distributed within each doubling period; 2) the doubling times specified are averages anticipated through the period under consideration; 3) the base / seed number represents a stable cumulative estimate

TABLE 2
Canada: projected AIDS cases, May 1987 through May 1998

	More optimistic estimates		Current estimates	
Year	Accumulation	New cases	Accumulation	New cases
	24-month doubling time		18-month doubling time	
1987	1,012[1]	–	1,012[1]	–
1988	1,518	506	1,690	678
1989	2,024	506	2,692	1,002
1990	3,036	1,012	4,048	1,356
1991	4,048	1,012	6,760	2,712
	36-month doubling time		24-month doubling time	
1992	5,397	1,349	10,140	3,380
1993	6,747	1,350	13,520	3,380
1994	8,096	1,349	20,280	6,760
	48-month doubling time		36-month doubling time	
1995	10,120	2,024	27,040	6,760
1996	12,144	2,024	33,800	6,760
1997	14,168	2,024	40,560	6,760
1998	16,192	2,024	54,080	13,520

1 Base/seed number.

through May 1987; 4) no interventions are likely (i.e., no vaccine and no cure); 5) adjustments owing to a slowing rate of infection through behaviour modification are reflected correctly in the periodically extended doubling times presented; and 6) current trends in the extending doubling times continue through the successive periods considered.

The "current estimates" support those projections provided by the Laboratory Centre for Disease Control, Ottawa, through 1991; by mid-1991, an accumulated Canadian total of about 6,500 cases of AIDS is likely. The "more optimistic" estimation approach employs more the soothsayer line which states that the doubling time will continue to be extended at a more accelerated rate. However, it is pointed out that with the more recently recognized extension of the incubation period for AIDS (to an average of about five years, rather than about two years) the "more optimistic" estimates indeed may be overly optimistic. In fact, the "current estimates" are likely the more prudent. Despite this, the "more optimistic" estimates through 1991 are only two-thirds of the more realistic "current estimates," and still predict a dramatic rise in the number of AIDS cases.

Table 3 presents estimates for the province of Alberta. This province accounts for approximately 10 per cent of the Canadian population. The "more optimistic" estimates may be more realistic only for smaller regions / centres where education may have had an effect earlier in the epidemic experienced in such regions. However, the base / seed number may adjust for this factor. Thus,

TABLE 3
Alberta: projected AIDS cases, May 1987 through May 1998

Year	More optimistic estimates		Current estimates	
	Accumulation	New cases	Accumulation	New cases
	24-month doubling time		18-month doubling time	
1987	59[1]	–	59[1]	–
1988	89	30	99	40
1989	118	29	157	58
1990	177	59	236	79
1991	236	59	394	158
	36-month doubling time		24-month doubling time	
1992	315	79	591	197
1993	393	78	788	197
1994	472	79	1,182	394
	48-month doubling time		36-month doubling time	
1995	590	118	1,576	394
1996	708	118	1,970	394
1997	826	118	2,364	394
1998	944	118	3,152	788

1 Base/seed number.

through 1991, the more realistic "current estimates" project an accumulated case burden for Alberta of almost 400 cases. Again, the "more optimistic" estimate of about 250 cases is almost two-thirds of the more realistic estimate.

Estimates of those currently infected are needed to provide the base / seed number for estimating future infections. Methods of estimation are described below. Projections must assume an annual rate of seroconversion which itself will remain a function of behaviour change over time. For the purpose of Table 4, this rate is assumed to be 4 per cent. In addition, Table 4 is based on what I believe to be a conservative (lower) estimate of the population at risk for acquiring infection in each successive time period (i.e., 10 per cent of half of the estimated "more" sexually active population, between the ages of 15 and 70 years; or, 800,000 for Canada and 80,000 for Alberta, based on the 1981 census, assuming a stationary, non-migratory population). In the absence of any data to refute these assumptions, the estimates in Table 4 should be interpreted as being optimistically low.

The base / seed number used for Table 4 is less valid and less reliable than its counterparts used in Table 2 and Table 3, since AIDS is reportable and no HIV-prevalence studies have been undertaken across Canada. There are two ways that estimates are determined for the number of infected people in the population. First, for every person reported with AIDS, estimates have been made (from the ratio of those infected relative to those with AIDS in various groups under study) that there are perhaps 30 to 300 people, depending on the

TABLE 4
Canada and Alberta: projected numbers of HIV-infected population[1]

	Canada		Alberta	
	Accumulation	New Infections	Accumulation	New Infections
1987	75,000[2]	–	5,000[2]	–
1988	104,000	29,000	8,000	3,000
1989	131,840	27,840	10,880	2,880
1990	158,567	26,727	13,645	2,765
1991	184,224	25,657	16,299	2,654
1992	208,855	24,000	18,847	2,548
1993	232,501	23,646	21,293	2,446
1994	255,201	22,700	23,641	2,348
1995	276,993	21,792	25,895	2,254
1996	297,913	20,920	28,059	2,164
1997	317,997	20,084	30,137	2,078
1998	337,277	19,280	32,132	1,995

1 Based on an estimated constant annual incidence of 4 per cent among 10 per cent of half of the estimated "more" sexually active population between ages 15 and 70 years: 800,000 for Canada and 80,000 for Alberta (stationary population).
2 Base/seed number.

risk group, already infected (75). A crude ratio of 1:100 often is used as an "average." It is important, therefore, to attempt to cross-validate wherever possible such crudely estimated numbers of people currently believed to be infected. To this end, if we assume that 1) 30 per cent of people infected will develop AIDS within a period of, say, eight years; and 2) most of those who will develop AIDS within the next five to 10 years already are infected with HIV; then, by reverse extrapolation—using the 1995 projected AIDS case-load from Table 2 and Table 3 respectively—two sets of estimates for each of the "more optimistic" and "current estimates" have been obtained. The first set is calculated by using the 1995 AIDS case-load projection. For example, from the Canadian "current estimates" in Table 2, the 1995 projection is for 27,040 cases of AIDS. Therefore, prevalent infection is calculated as $(30 \div 100) \times X = 27{,}040$; that is $X = 90{,}133$. Similarly, based on the "more optimistic" estimates, prevalent infection is 34,000. For Alberta, the respective estimates are 5,250 and 2,000.

A crude upward adjustment of one-third, however, is deemed necessary to compensate for the extended doubling time constants (through 1995) applied in the empirical modelling in Table 2 and Table 3. Hence, for Canada, the "current" and "more optimistic" estimates are 134,300 and 50,750 respectively; equivalently for Alberta these are 7,850 and 3,000 respectively. This method of cross-validation provides some assurance that the base/seed numbers used in the calculations for Table 4 are not unreasonable. The method used for cross-validation is not unreasonable either, since the projected number

TABLE 5
Canada and Alberta: expected living AIDS cases and expected hospital days[1] per year based on 50 per cent alive at any time[2]

	Canada		Alberta	
	Based on current AIDS estimates	Hospital days	Based on current AIDS estimates	Hospital days
1987	506	20,240	30	1,200
1988	805	32,200	50	2,000
1989	1,346	53,840	79	3,160
1990	2,024	80,960	118	4,720
1991	3,380	135,200	197	7,880
1992	5,070	202,800	296	11,840
1993	6,760	270,400	394	15,760
1994	10,140	405,600	591	23,640
1995	13,520	540,800	788	31,520
1996	16,900	676,000	985	39,400
1997	20,280	811,200	1,182	47,280
1998	27,040	1,081,600	1,576	63,040

1 Average hospital days (40) based on Graves and Moien (Ref. 78) and on 16 days/visit; 2.5 visits/year.
2 Assuming no treatments or cures emerging.

of AIDS cases through 1995 is calculated independent of any knowledge of the prevalence of HIV infection.

Table 5 projects for Canada and Alberta the potential impact on an aspect of the health care system, namely, in-patient hospital days, assuming no treatments or cures emerging. The numbers are calculated based on 50 per cent of the cumulative total number of AIDS cases expected to be alive at any one time and based on the "current estimates." Also assumed in these estimates is that current treatments will have little impact on hospital days, which could prove quite erroneous in the presence of current drug trials with AZT (Retrovir). Nevertheless, all hospitals must brace themselves for the coming of the epidemic to the neighbourhoods they serve; education, financial planning, and legal consciousness are the essential coping mechanisms (76, 77). The dramatic demand for health care (together with the urgent need to create supportive environments) exemplifies the central role of government for leadership in AIDS.

CONCLUSIONS

In terms of limiting the spread of infection, the Canadian response to AIDS has been only marginally less neglectful than that of the United States. Particularly neglected in Canada have been the needs of low prevalence regions. It is suggested that with continuing neglect, research, and public health control

measures will continue to be irretrievably lost. The cost implications of the impact of AIDS over the next decade not only on health care delivery but also on social and political order will be significant. Urgent national and local strategies are needed to minimize longer-term ramifications.

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Ethical Issues Raised by AIDS†

I HAVE BEEN GIVEN the challenge of presenting the ethical issues raised by the AIDS epidemic. Were I a professional ethicist, I would sort the problems, and balance proposed solutions according to principles of personal privacy, harm, beneficence, justice, and the duty to warn. But I am not trained in such parlance, and my credentials for this specific assignment might be considered suspect: I am a virologist, an epidemiologist, an infectious disease pediatrician, and a public health dean—and my qualifications in the realm of ethical discourse stem largely from "on the job training" during the difficult debates that have evolved in recent years concerning American public policy and the AIDS epidemic.

In the past year or so I have also participated in World Health Organization deliberations about the global aspects of AIDS, and as the gloom of the emerging pandemic has deepened, it has been one of the few bright spots for me to discover just how similar is the approach of thoughtful and knowledgable people around the world to the threat that the human immunodeficiency virus poses to the human family. As awareness grows of the extensive scientific base of knowledge on which policy can be based, the first panicky, ill-focused reactions—which regularly take the form of a wish to institute mandatory screening programs, to adopt unilateral national policies of insularity, and to isolate or quarantine infected individuals—give way to compassion and awareness of the extent of human tragedy implicit in the epidemic. Indeed, what our sophisticated science has done for us is to provide such abundant and convincing information about mechanisms of viral transmission and infection

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that for the first time in human history we can afford to react to an epidemic disease with compassion rather than out of fear. Of course, first we have to share that information widely with a terrified public, and we in the United States have not done well at that so far—a point I will come back to.

Anyway, my approach to the task of discussing ethics is of necessity amateur; and I think the more knowledgable humanists among you will spot quickly my substitution of social issues and human rights concerns for genuine ethical conundrums. That will leave the job partly undone, but the social and ethical issues of AIDS are so tangled and complex that there will not be time enough even for my component of the task. For a more orderly treatment of the ethical issues *per se* I commend to you an excellent discussion by Bayer, Levine, and Wolf from the Hastings Institute which appeared in the *Journal of the American Medical Association* last year (*J.A.M.A.* 256: 1768–74, 1986).

The most positive aspect of my endeavor stems from the assertion that *good data make good ethics*. That principle was repeatedly emphasized by LeRoy Walters of the Kennedy Institute at Georgetown, during the course of the study of the AIDS epidemic by the Institute of Medicine / National Academy of Sciences in 1986, and I have found it a valid and useful guideline; it tells us to make sure that we are using all the information we have as we construct and weigh policies with profound ethical implications. The data are impressively good—biomedical science and epidemiology have given us an extraordinarily clear description of our viral adversary. While those data tell us that vaccine and cure are too far off to wait for, they bring home the point that transmissibility of the human immunodeficiency virus is so poor that casual and contact-contagion are not at issue.

Indeed, once the virus of AIDS was identified and the blood supply was secured (in those parts of the world affluent enough to be able to exercise that option), *avoidance* of HIV became a feasible personal strategy. Hard choices accompany that strategy of avoidance, to be sure, for individuals whose lifestyles put them in the path of the virus; but for persons who are not at risk from sexual or drug-using practices, there is no threat. It is important for them to learn that fear is inappropriate, for if panic can be avoided, the opportunity is there for society to rise to the complex medical, social, and economic challenges of AIDS in ways that will have lasting value.

In assessing our options, it is potentially instructive to learn from history, and the examination of past plagues and pestilence has become an academic enterprise which holds widespread fascination, quite appropriately. Many of you will be familiar with William McNeill's book *Plagues and Peoples*, published in 1976, in which he traced the probable origins of a number of familiar human pathogens through their initial perturbations of historical events—the most familiar and dramatic one, perhaps, being the role of smallpox in the conquest of Mexico. He points out interestingly that many of our familiar microbial enemies are closely related immunologically to viruses of domestic animals; and to me at least, it was McNeill's analysis that made it

unsurprising to learn that there were retroviruses of other primate species in Africa that are close relatives of HIV on the molecular level.

Monkeys, of course, are not domestic animals; and so to construct a satisfying hypothesis concerning the origin of HIV, it is useful to learn, further, that such monkey-retrovirus hosts are a food source for human populations with whom they coexist, and that indeed the monkeys are often captured and tethered for several days prior to taking their place on the menu. (Thus there is no need to entertain visions of bestiality in order to imagine how the new virus achieved successful adaptation to man, for there is surely much biting and scratching on the way to the table.) One can suppose, then, that what apparently has happened is that, after centuries of trying, one or more viruses inherent to another primate species has made the successful leap into man.

As an aside, I must comment that appreciation of the durability of that fact has been lacking in much public policy discourse to date. The world changed forever when HIV established itself in humans; to use an analogy from American history, it was like the day after Pearl Harbor—nothing would ever be quite the same again. One reads much public policy discussion which seems to be tentative: "what to do until the vaccine comes" is the general tone; and yet the virus will be with us forever and even the banishment of smallpox was more a feat of administrative brilliance than a vaccine coup. We fool ourselves if we try to embrace temporary strategies while waiting for technology to solve our problems, or if we adopt makeshift programs to deal with infected persons. If we are very wise, we may find ways to curtail the exponential spread of the virus; but it was so widely seeded in the human family before its detection that some of the most apparently alluring options—such as isolation, quarantine and the like—have been out of the question for years, if they ever held any rational promise.

Our generation has spent much time worrying about thermonuclear bombs, and for good reason. But while we were doing so, less than thirty years ago, a veritable microbiological bomb was quietly detonated in our midst. Now it is up to us to see whether we can mobilize what we have learned over the centuries; in an era in which science and technology have been turned to with almost blind confidence (and in which the flaws in our knowledge of social sciences have been far too little appreciated), it will be our challenge to face this new pandemic microbe without immediate recourse to drugs or vaccines.

Will we be able to modulate our public and private responses to fit the facts as we learn them, or will we overreact and try to build walls around our unfortunate fellow men and victimize them? Are we really any different from our distant relatives of the fourteenth or eighteenth centuries as they cowered before the Black Plague or the invisible menace of yellow fever? What can we learn from history and how do we cull the pertinent lessons from those that are archaic or irrelevant? The seriousness of this last charge—not just to seem to learn, but to learn *well* from past generations—is underscored in a passage from T.S. Eliot's "Gerontion," which I believe carries a warning about reliance

on the obvious, about turning too quickly to technologic "fixes" for our human and social problems. He said:

> Think now
> History has many cunning passages, contrived corridors
> And issues, deceives with whispering ambitions,
> Guides us by vanities. Think now
> She gives when our attention is distracted
> And what she gives, gives with such supple confusions
> That the giving famishes the craving. Gives too late
> What's not believed in, or if still believed,
> In memory only, reconsidered passion. Gives too soon
> Into weak hands, what's thought can be dispensed with
> Til the refusal propagates a fear.

Erato is a powerful muse, and we ignore her at our peril; but outright rejection of historical lessons is not the only possible error, for a misunderstanding of her message is every bit as deadly. We must scrutinize carefully the facts of our new pandemic situation, and select with painstaking care the lessons to be learned from earlier times.

The misperception of history has contributed to a shrill debate, which has been on a crescendo in the United States of late, about the approach to identification and testing of HIV-infected individuals. At issue is the serious question of whether individual privacy can and should be invaded without attention to the subject's wishes or confidentiality in order to curtail spread of the virus. As I argue below, it is a false issue, in that I believe curtailment of further virus dissemination can be *best* achieved by careful attention to those very matters of privacy. But invasion of the personal domain of potentially infected individuals seems to be a hallmark of a politically attractive stance for those who perceive the persons at risk of infection to be morally flawed; even the editor of *Science* magazine felt impelled to call on individuals at high risk to give up unspecified human rights in the interest of the rest of us; and as you know, the tendency to call for maximum deployment of the HIV antibody test, without regard to the usefulness of such policies, is almost as epidemic in the United States as is the virus, right now.

Recently, for instance, I testified at a congressional hearing where Congressman Dannemeyer of California berated me (and others) about being too engrossed in issues of civil liberties at the cost of public health. His triumphant evidence of the power of his argument was that way back in the 1940s we had adopted what he perceived to be effective measures, such as mandatory contact tracing and universal premarital blood testing, for handling the syphilis problem; and yet here we were, ignoring the presumed wisdom of that experience and instead advocating voluntary programs. I wonder how he managed to persuade himself that mandatory contact tracing was such a

powerful tool? Perhaps he missed the fact that we were already undergoing a rampaging epidemic of a dozen sexually transmitted diseases at the time AIDS first appeared; how could that have been, if our tried-and-true public health approaches were so certain?

In fact, it has been well argued by Allan Brant, in his fascinating study of the American response to sexually transmitted diseases, *No Magic Bullet*, that our coercive social responses did not work at all well. Even common sense would argue that *mandatory* contact tracing works only as well as the cooperativity of the index case will allow; and there are those who argue that efforts to enforce such heavy-handed public health approaches will simply ensure that anonymous sexual encounters continue.

As to premarital screening, its inefficacy and unwarranted cost have led increasing numbers of states in the United States to abandon it in favor of more focused policies. As the *New York Times* remarked dryly in an editorial opposing such broad-brush responses to the epidemic, the premarital syphilis tests was dropped in New York recently because "the results were not worth the cost, and because of suspicion that some couples nowadays have sex before marriage." The very gravity of our epidemic situation demands that we be honest in our assessment of past policies, and if we are honest with ourselves, then, in point of fact, I think penicillin, rather than public health officialdom, deserves the credit for curtailing syphilis; and the explosive spread of antibiotic-resistant gonococci and the advent of chlamydia and a host of untreatable sexually transmitted diseases should warn us not to be so reliant on past strategies. The stakes are too high for such hubris.

What we have not tried as widely as I believe we must is the focused, voluntary approach: since spread of the virus is almost exclusively dependent on consensual behavior, we should not be so ready as is the congressman from California to throw in the priceless towel of voluntary cooperation in the unsubstantiated "interest of public health."

Let us be very clear: the horror of AIDS and its inexorable progress to an unpeaceful death is such that any ethical analysis would clearly mandate whatever public health policies are best designed to abort the epidemic at the earliest opportunity. Therefore the major choices which raise ethical issues center around transmissibility: How can we protect the interest of the uninfected public? Can we find ways to do so while providing maximally effective and compassionate care to those infected with HIV?

The interplay between ethical principles of privacy, of avoidance of harm to others, of justice, and of beneficence, translate in social terms into a set of tough, pragmatic problems whose solution will determine whether great numbers of persons with AIDS will have access to humane care and comfort during their dying years, and even before that, whether their training and talent will be negated or abandoned at the time of virus recognition or facilitated for the months or years of their remaining well-being. It is important to remember that we are talking about thousands of adults in young or middle age, and that

they may be silently infected for many years prior to onset of illness. If we needlessly adopt social policies which restrict their ability to function in society, the magnitude of waste of human talent and creativity will be appalling. Unnecessary curtailment of their employment will have devastating pragmatic effects as well, for they belong to the economically productive segment of society and no alternate means of provision for their sustenance is obvious.

Our interest lies not only with the minimizing of disruption for infected persons, however. Wide dissemination of information and reassurance will have a marked impact on the quality of life for the worried well. Right now there is a great deal of diffuse anxiety and needless fear on the part of individuals whose behavior does not put them at risk; public education about the non-transmissibility of the virus by casual contact could allay such terror and, perhaps more importantly, rescue society from the dehumanizing effect that comes from acting against one's fundamental compassionate response to fellow human beings in trouble. One of the pertinent lessons of twentieth-century history, I believe, is that legitimization of negative herd reactions has a numbing effect on all participants; so we must be sure we proceed no further in that direction than is absolutely necessary on the basis of the data.

These several lines of reasoning make issues of transmissibility of the virus of AIDS paramount in arriving at optimal public policy for its containment. Furthermore it becomes evident that public education is a critical ingredient in successful adoption of well-reasoned policy: the unmodified instinct for self-preservation is likely to produce repressive reactions far stronger than our fragile democratic institutions can bear. Therefore we should spend a bit more time on the matter of viral transmission. I have told you that poor transmissibility is a property of the virus of AIDS, but am I correct? How does that stack up to the real world in which we think that more than ten million people have become infected already in less than three decades of epidemic spread?

I have spent a good fraction of my life lately talking about the epidemic to groups who do not have a background in biomedicine. Clearly the idea of restricted modes of virus spread is a difficult one for people to accept; and because I am so concerned that the answer I give at this stage of an AIDS discussion be received as credible by my audience, I have given some thought to what barriers may be standing in the way of their acceptance of reassurance. That is the one piece of really good news that our hard-won scientific advance has brought us; and indeed, the fact is that sexual, percutaneous, and perinatal transmission *are* the modes of spread of the virus of AIDS, and that handshakes and gentle kisses, mosquito bites and schoolyard tussles simply do not work! But that answer is hard to assimilate and I think it meets with unusual resistance for several very different reasons.

First, it makes the public worry about gullibility (which is an awful feeling in a sophisticated society). Unhappily, the medical profession has failed to share its confidences in the past, preferring instead to appear wise beyond common

understanding. As a result, we have no public base of biomedical common sense on which to depend in describing this pattern of nontransmissibility. There are no old wives' tales about HIV, and the idea of a non-transmissible infectious agent defies old folklore, ... and our own credibility is not good. In fact we encounter very similar resistance when we try to say that the common cold is spread by hand-contact rather than by cold feet or a wet head. There is a regrettable void between where grandmother left off and where high-tech microbiology and newly powerful epidemiologic methods pick up the themes of contagion.

We actually perpetuate our problem in more subtle ways, for instance when we persist in discussing placeboes as "sugar pills," thereby imputing to the placebo-responder a sort of moral weakness or a tendency to malingering, rather than admitting our own ignorance and facing the formidably complex interplay of physiology—about which we know so much—with the psyche, about which we know so little. And many a physician has capitulated to the temptation to use antibiotics to placate patients with viral infections, rather than to admit that there is a vast evolutionary divide between bacteria and viruses, which allows readier chemical treatment of one than of the other. It would be so helpful now, as the pressure mounts for antiviral drugs against the virus of AIDS, if the public only understood that rudimentary biologic distinction! The disproportionate attention paid to scraps of progress toward antiviral treatments for AIDS, in contrast to a lack of public outcry about absence of a coherent program of public education, is telling evidence of incomprehension of this point; and the mistaken emphasis is not trivial, for discussions of far-off cures and vaccines distract terribly from the difficult behavioral messages we must transmit.

To finish the point about the unprepared mind of the public: on my short drive home from the University of Michigan School of Public Health, if I take a certain route, I go past the Ann Arbor branch of the Church of Scientology, a flourishing tanning establishment, a tattoo parlor, and a well-heeled chiropractic suite of offices. It serves to keep me humble about the present state of health education, I assure you!

So, we have earned a bit of our trouble through past failures to share with a consuming public the fundamental understanding provided by our science base. As a corollary to that, we have permitted a major confusion between science and technology, between fundamental insights and engineering wizardry. The assumption is that because scientists have done such a magnificent job of defining and describing our viral enemy, a technologic solution should be right behind; and of course that does not follow at all.

How can we catch up and regain public credence at this critical juncture? I believe that the residue of populist tradition, which served effectively in times past to protect sensible people from quackery can be turned to our advantage if we speak plainly. If I merely recite to an intelligent audience data and

conclusions from the CDC studies of non-transmission of HIV, they often miss or reject the point and focus on aberrant cases or exceptions which should really prove the rule, for their "common sense" is not in gear.

However, if I enlist their participation, comprehension comes more quickly. For instance, I challenge them as follows: Suppose that *you* did not have to concern yourself with the issues of ethics in human experimentation and wanted to prove that the AIDS virus *could* be spread by non-sexual contact, what would you do? Why, you would probably set up situations in which dying AIDS patients were hugged and kissed, where razors and toothbrushes and utensils were shared over periods of weeks and months, and then test the people so exposed." And then I tell them that, as it turns out, the experiment has been done, inadvertently, in dozens of families where loved ones died slowly of AIDS; and the CDC tested family members thus exposed, not once but on numerous occasions over the succeeding months. Not a single person even became infected without sexual contact!

But perhaps that is not a tough enough experiment. This is, after all, a life-and-death matter. What if you wanted to press the issue further, how would you do it? Well, you would probably turn to hospitals where AIDS patients concentrate, and to health care workers who had to care for profoundly ill HIV-infected patients even before they were identified as such, handling all manner of secretions and tending to every bodily function. Well, the CDC has done that too; and out of several hundred who were carefully followed, not a single person who did not personally have a risk factor had even been found to be infected—until two weeks ago when three nurses were reported to have been infected through extensive contact of blood with broken skin. Should that change our interpretation of non-transmissibility? Of course not, for the denominator of thousands of exposed health care workers has not changed. It simply reinforces the wisdom of the established guidelines for wearing protective gear when handling potentially infectious material.

But perhaps one should do the ultimate experiment: take needles and scalpels directly from AIDS patients and poke other people with them. One would cringe from designing such an experiment even in the abstract; but in fact it too has happened, and the results were the same. Of over 1300 such accidental exposures followed carefully for many subsequent months, none developed AIDS, only three resulted in seroconversion, and only one of those lacked discernible risk factors besides the puncture.

Even with this effort to bring the recalcitrant skeptic about casual contagion to his knees, I find there are still refractory listeners who remain unconvinced. For them there is probably little that can be done: it reminds me of a favorite cartoon from the comic strip called *B.C.* In it, one caveman asserts to his friend, "I have now examined 264,729 snow flakes and no two are alike. If that ain't proof, what is?" To which his buddy replies, "Could be a lucky coincidence."

That, then, is what we know about non-transmission, and how we know it. I would be remiss to forget about mosquitoes, for they seem to buzz in

everyone's awareness, and failure to mention them leaves a listener suspicious. Not only are they *not* implicated in the AIDS epidemic, but the epidemiology positively belies their potential role, for children in what could be called the "mosquito age group"—who play outdoors and lead the way as sentinels of other infections where mosquitoes play a role—are dramatically *un*involved in the AIDS epidemic, not only in good test areas of the United States like Florida and New Jersey but in Africa as well. Between infancy and the age of sexual activity there is a striking absence of antibodies to the virus as well as of AIDS and related diseases caused by HIV.

So we are left with sexual, percutaneous, and perinatal transmission, and that puts us in a position where there is a duty to warn: we must be sure that our elegant science, which has brought us so far so fast in the understanding of transmission patterns, is not neutralized completely by a moralism which rejects discussion of any option except monogamy or chastity. I know of no society in which those are the sole pattern of sexual behavior, and ours is surely not going to be the first! Failure to warn about the new virus and its lethal consequences is an extraordinary punishment for unapproved sexual activity, and it seems to me that we are ethically bound to say what we know about prevention. Condoms, for instance, are quite effective (although not foolproof) in preventing the spread of the virus of AIDS during intercourse when used appropriately; and it is hard to believe, when condoms are among the perilously few defenses we have to turn to in limiting the spread of a killer, that someone could perceive silence as an ethically defensible stance. And yet, as you know, we continue to argue about such things in the United States, and have yet to initiate any kind of coherent national educational campaign to alert sexually active adults to the fact that the world has changed. Worse yet, our public laws—enforcing an unreal morality—mitigate against prudent behavior; for instance, I am told that in San Francisco a woman found carrying condoms could be arrested for prostitution!

What about drug users? and needles—How about free needles? As commonly happens with a good catch-phrase, the notion of "free needles" sets morals aflame and distorts the argument. You should know that in the United States most states have laws which make it illegal even to *possess* injection apparatus, and it is contended that easy access to needles and syringes would encourage drug use! The idea is akin to the suggestion that public acknowledgement and discussion of homosexual sex would lead to homosexuality. My friend Mervyn Silverman deals with that with the scorn I think it deserves. He suggests that choice of sexual lifestyle is almost surely a complex matter and tells of the graffiti he came across in a men's room, "My mother made me a homosexual." Beneath it another person had scrawled, "That's nice—if I buy her some yarn, will she make me one too?" In the context of drug use, needle exchanges are touted by some as an answer; but the issue is not easy. As I will point out shortly, however, intravenous drug abuse is a wide-open gateway to further diffusion of the virus of AIDS and so this matter merits careful attention.

The truth of the matter is that we simply *do not know* what impact such policies would have, but quarreling about morality will not resolve the issue, and it is surely worth finding out. For these reasons, the Institute of Medicine / National Academy of Science study group recommended an experimental test.

The needle argument is a distraction, of course, from the shocking shame of our "war on drugs." Some "moral" crusade, when no accommodation is made for prisoners of war! There are not now enough treatment slots in the United States to accommodate those addicts who already "want out," and when we had hearings in New York City during the Institute of Medicine study, the drug people begged us AIDS people not to become too effective with our messages since drug treatment facilities were already so overloaded with individuals trying to break out of their dependency that further AIDS alarm would overwhelm the system. Can you imagine putting a heroin addict on a six-month waiting list when he seeks treatment?

But I digress—I can get pretty upset about the ethics that underlie policies which dictate that more funds are proposed to be used on screening U.S. federal employees' urine than on all the facets of AIDS education. Drug users occupy a strategic position on the path to tomorrow's epidemic, and our ability to deal with them now will have great bearing on the scope of the AIDS problem a decade hence. By 1991 the percent of women involved in the American epidemic is predicted to go from 7 per cent to 9 per cent with drug use or sexual partnership with a drug user as the major vehicle. More than 90 per cent of pediatric AIDS in 1991 will be the direct or indirect result of drugs; and pediatric AIDS is a disaster beyond imagining, coupling as it does the sustained and desperate illnesses of immunodeficiency with the likelihood of orphan status, minority status, and neurologic decline. Even in the context of female prostitution, the likelihood of a prostitute being infected and therefore potentially infectious tracks dominantly with intravenous drug use.

I have dealt thus far with the facts that should drive our public programs and should underlie our ethical decisions in the realm of public policy. With those facts in mind, let us look then at some of the contexts in which ethical issues arise during the AIDS dialogue. First we should dispense with some of the easier ones: the concepts of quarantine and / or isolation which are often proposed (and strongly supported in public opinion polls) as a means of curtailing the epidemic are ethically repugnant. I will not spend much time on this, for there should be no need to argue about ethics in the face of an impossible option. In the United States, with a couple of million infected souls already among us, the logistics are daunting, to say the least. (I understand that someone suggested an island in Buzzard's Bay, off the coast of Massachusetts; but either he did not quite have the scope of the problem in mind or my geography is egregiously wrong.) How would we do that, even if we found the right kind of island? Would we feed them? I guess we would certainly have to guard them to keep them from slipping out; and I guess we would also have to guard the guards, since the temptation to slip *in* would always be there for the individuals whose

responsiveness to sexual allure overcame their caution. It seems silly to take such nonsense any further, except that Proposition 64 in California came close to mandating just this kind of thing, and the winds of society leading in this irrational and dangerous direction are blowing strong.

I bring this issue up first, because I suspect that some kind of quarantine option underlies the remarkably tenacious wish to screen. When pressed to explain their position, advocates of mandatory or "routine" antibody testing to detect asymptomatic infected individuals fall back on the rationale that it would be desirable to know with greater accuracy how many people are infected. But we do not have to violate people's privacy to do that; we can get a very good idea of virus prevalence through anonymous samplings of collected sera. Furthermore, I would suggest that since we are not gearing up very well to handle the numbers we know about now, refining those numbers is not a very persuasive justification for intrusive activities.

There are lesser versions of this kind of universal, mandatory approach, of course. William Buckley, Jr. had one: How about tattoos on arm or buttock of seropositive people to warn those who might otherwise become infected? That really is not worthy of Mr. Buckley's usual level of mentation, for the effect would be almost *purely* repressive unless one embarked on a program of public awareness so that people would be sufficiently attuned to the significance of the tattoo to stop doing whatever it was they were about to do, and instead go and do something else! And since we want to educate the public to avoid infection anyway, why complicate the matter with repression and tattoos?

What about more restricted non-voluntary use of the antibody screening test? Prostitutes, prison populations, inmates of custodial institutions, hospitalized patients? These proposals vary in merit, to some extent, but with few exceptions they miss the fundamental point. The antibody test is useful as an adjunct to behavioral counselling, not the converse; and change in intimate sexual and drug-using behavior is far less likely to occur under mandate than it is by voluntary participation and cooperation. The human resources necessary for conducting counselling to effect such behavioral change are in short supply right now, what with blood screening and alternative test site programs; and wasting such resources on poorly targeted mass programs is hardly wise. For those of you who have not been close to the actual dynamics of the epidemic, I should tell you that counselling is of critical importance for another reason as well: the psychological impact of a positive antibody test has such appalling power that the maximum "suicide point" in the American epidemic experience has been at the time people learn that they are seropositive, even more than when they learn the diagnosis of AIDS.

Before I leave the matter of testing, about which much of the current ethical debate swirls, I should make clear what I think *is* warranted. I believe that a sound and pervasive program of public education should be undertaken so that individuals whose private behavior has perhaps put them at risk of infection will be alerted. I think that resources should be deployed to make it possible for

such persons to seek testing voluntarily under circumstances which are at least private and confidential, but where anonymity can be assured if it is deemed necessary to bring the person to seek such information. And no testing should be done without careful pre- and post-test individual counselling which can adapt the general information to the needs and level of the individual, including opportunities for follow-up information. The ascertainment of antibody status to the virus of AIDS should never be viewed as "routine" in the same way that serum sodium or blood glucose tests may be. What is more, the impact of false positivity should not be lost from view in the wish to measure population distribution of the virus; for while the antibody detection test is as good as any in the medical armamentarium, it is not foolproof, and the ethics of delivering a false message of HIV infection where none exists should not require discussion.

I have dealt at length with screening issues because they dominate present discussions. I hope it goes without saying that our society must address issues of health care access, delivery, and financing with a sense of urgency. The area of vaccine development raises some less obvious issues which may be worthy of brief discussion. The scientific challenge to find an effective vaccine will be a daunting one, but even should it succeed, how would we test and use such a vaccine? How could we possibly find individuals at sufficiently high risk of infection that we could validate the protective effect of the vaccine, and yet not interfere with our own experiment by the ethical imperative to educate them to reduce their risk? This is just the first of many difficulties inherent in final deployment of an AIDS vaccine, and I do not want to seem nihilistic for I believe, in fact, that vaccine efforts must proceed rapidly despite such discouraging problems; to the extent that we fail with preventive education now, we will need a vaccine many years hence. We should note, however, that it is unlikely that a vaccine will be fully available for five years, or ten, and possibly never. If we do not do something pretty significant while waiting, the world will have changed beyond recognition by the time vaccine options are at hand.

The scope of the epidemic worldwide raises still other matters which will continue to put ethical analysis to the test, but always they play out in difficult terms of cost / benefit / risk analysis. For instance, it appears that breast milk can transmit the virus of AIDS; and yet in areas of central Africa where up to 30 per cent of pregnant women appear to be infected, alternative caloric sources are lacking. Similarly, the immunization of children throughout the world is one of the striking advances of the twentieth century, and yet fear of needle contamination jeopardizes continuing immunization programs in the very areas where measles and polio continue to threaten. The obvious solution there, of course, is to strengthen needle sterilization procedures rather than to abandon protective immunization.

Blood transfusion is becoming a worrisome matter in countries where the cost of a single screening test exceeds the annual *per capita* expenditure on health care and yet where the HIV seropositivity is as high as 10 per cent among

blood donors tested. The option to discontinue use of blood transfusion may not be an open one when accidental trauma demands replacement therapy or when a pregnant woman at term presents for delivery with a hemoglobin of two grams!

These are dreadful choices and we will have to work hard as a world community to resolve them optimally. But for the moment we are left with a difficult but powerful weapon to deploy: that of education for prevention of further spread of the epidemic. Even though that option presupposes change in human sexual and drug using behavior (when we cannot even influence one-third of the adult population to stop smoking) it is all we have to go on right now, and we must embark on the tedious low-tech road to full public awareness and understanding.

We can add some modern touches, of course, if we use our incredible weapons of communication and persuasion. Television and electronics have catapulted us into a position where we can transmit information even despite our appalling rate of functional illiteracy, just as we have been broadcasting our diffuse fear about the epidemic throughout the third world until now. I am optimistic about the success of such a campaign, for even without it the American public has been learning some of what it needs to know by "underground" means, as witness the thriving business of those singles clubs which now test at six-monthly intervals for freedom from infection, for a high fee.

We do need a couple of other kinds of educational campaigns as well, however. We need to be sure that health professionals are fully briefed. Before the United States Public Health Service came out with its extraordinary suggestion that anyone who had received blood since 1979 should seek medical advice, stories were rife of worried well who sought testing through their private physicians only to be told not to worry, that AIDS was "only a gay disease." People must understand the irrationality of their fears about casual contagion, but they must also be aware of the full potential for heterosexual spread. Health care personnel must modulate their self-protective strategies to the reality of exposure possibilities. We must plan actively for the thousands and thousands of young adults who will need sustained support in settings outside of high tech hospitals, and funeral directors perhaps make the case the most poignantly, for the diagnosis of AIDS pursues its bearer beyond the grave these days, and dreadful post mortem scenes have erupted out of misperceived risk.

Finally, as to the so-called high risk groups themselves. They are not "groups," of course. They are individuals, sometimes members of subcultures but perhaps just members of families, deviating from a mythical norm which is hard to find in reality. It is their *behavior* that puts them at risk, and they must be warned so that they can reconsider and behave responsibly to themselves and to their loved ones.

The time has come to do things right. I believe we have plenty to do and a momentous ethical mandate to educate and to prevent further spread of the virus

of AIDS by means that do not destroy the pluralistic nature of our society. If we fail to accept that mandate, then Khalil Gibran's "house of tomorrow" in which our children are to dwell will be in perpetual mourning. If we rise to the challenge and use our scientific data base to tailor solutions and avoid overreaction, we can redress some societal and social problems in ways that can have benefits far beyond the parameters of the AIDS pandemic. As we devise public policy for the years ahead, I hope we will keep in mind the familiar, humane affirmation of John Donne: "No man is an island, entire of itself; every man is a piece of the continent, a part of the main; . . . any man's death diminishes me, because I am involved in mankind . . . ." (*Devotions upon Emergent Occasions*, Meditation XVII.) We are all part of the human family, and that awareness must dictate the ethical considerations in the AIDS pandemic; a firm sense of individual worth must be maintained in the face of the difficult stresses that lie ahead and the categorical solutions sure to be propounded without reference to individuals.

ACADÉMIE I

Académie des lettres et des sciences humaines

COLLOQUE:
LE CHANGEMENT DES INSTITUTIONS
AU QUÉBEC ET AU CANADA

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Un changement institutionnel majeur: la croissance du secteur public†

UNE PART de plus en plus élevée de la production passe par les mains de l'État. De 1950 à 1984, à l'intérieur d'une production qui a quintuplé, la part des dépenses gouvernementales a plus que doublé : elles sont en effet passées de 22,1 à 49,0 pour cent du produit national brut ou de 28,0 à 63,3 pour cent du revenu national net au coût des facteurs.

L'intervention gouvernementale ne se limite d'ailleurs pas aux seules dépenses publiques. Quelle est en effet la différence analytique entre une subvention et une exemption ou une dépense fiscale ? Les modes d'intervention qui modifient les prix relatifs sont fort nombreux: subventions, taxes, tarifs douaniers, contingentements, achats préférentiels, réglementations traditionnelles ou « sociales », interdictions, garanties et assurances publiques.... Pour connaître précisément l'évolution de l'intervention gouvernementale, il faudrait agréger les effets de toutes ces mesures. Et là encore persisterait le problème selon lequel le tout n'est pas nécessairement égal à la somme des parties, certains instruments d'intervention ayant des effets opposés. Ainsi, si tous les secteurs de l'activité économique étaient protégés à vingt pour cent par différentes mesures, la protection effective de chacun serait nulle puisque les prix relatifs ne seraient pas modifiés.

Au cours du vingtième siècle et plus particulièrement depuis quarante ans, les pays occidentaux ont tous connu une très forte croissance de l'intervention gouvernementale. Ce texte étudie ce très important phénomène social. Il se

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divise en deux parties. La première passe en revue les différents facteurs proposés par les économistes pour expliquer la croissance du secteur public et la seconde indique d'importantes difficultés que cette croissance provoque et qui pourraient réussir à la ralentir considérablement.

FACTEURS EXPLICATIFS PROPOSÉS PAR LES ÉCONOMISTES

Différents facteurs ont été proposés par les économistes pour expliquer la croissance considérable du secteur public. Ce sont premièrement les différentes défaillances des marchés ou des processus décentralisés d'affectation des ressources. Ensuite, la croissance de l'État est perçue comme une substitution institutionnelle aux rôles traditionnellement remplis par la famille et les organismes religieux ou de bienfaisance. En troisième lieu, comme l'intervention gouvernementale résulte d'une décision politique, il est important de s'interroger si les processus politiques favorisent son omniprésence. Après ces trois ordres de facteurs qui peuvent être qualifiés d'institutionnels, il sera utile d'estimer la contribution de variables plus traditionnelles que sont les prix, le revenu et la population.

Les défaillances de la décentralisation

Les économistes ont traditionnellement rationalisé les interventions gouvernementales en se référant aux défaillances des marchés privés ou de la décentralisation. Ces derniers permettent généralement le développement d'une économie mieux orientée vers les préférences variées des individus. Au lieu d'être soumis à une autorité qui lui dicte ce qu'il peut détenir, chaque agent possède une liberté de choix, tout en étant bien sûr soumis à une contrainte budgétaire et au système de prix.

Malgré les bienfaits de cette décentralisation, les économistes ont développé tout un arsenal d'arguments pour justifier l'intervention gouvernementale. En effet, en plusieurs circonstances, les marchés libres seraient défaillants, incapables d'assurer un système de sanctions et de récompenses qui entraînerait le non-gaspillage des ressources. On parle de situations où il y a présence d'effets de débordement, d'économies de grande dimension, de biens publics, d'informations asymétriques entre les parties, de pouvoirs monopolistiques, de chômage involontaire et enfin, d'une distribution des revenus perçue comme insatisfaisante.

Dans le secteur de la santé qui fut presque complètement nationalisé au Canada entre 1958 et 1970, trois types de défaillances sont particulièrement avancés : les limites de l'assurance privée, les effets de débordement et enfin, l'ignorance du consommateur. L'incertitude et le risque que doivent affronter les agents économiques donnent naissance à une industrie qui agrège les risques, le secteur des assurances. Le marché a répondu à cette demande de services d'assurance pour différents risques par la présence de multiples firmes

à caractéristiques variées. Toutefois, une bonne partie de ce secteur est présentement nationalisée et c'est le cas au Québec pour les accidents de travail, l'assurance-chômage, l'assurance-automobile pour les blessures corporelles et surtout l'assurance-santé.

La substitution d'une présence gouvernementale à l'industrie privée a été justifiée par diverses raisons : économies d'échelle, information insuffisante pour une tarification efficace, une sélection défavorable et l'effet de substitution (ou hasard moral). L'assurance publique obligatoire permet de réduire les coûts administratifs comme le don d'un sac de vingt livres de carottes permettrait d'épargner le temps du caissier au supermarché. De plus, l'assurance privée a beaucoup de difficultés à développer une tarification efficace, reliée aux probabilités des dommages que peut encourir l'assuré. La tarification actuelle des jeunes conducteurs masculins ne pénalise-t-elle pas une bonne partie de ce groupe à cause d'une minorité d'irresponsables ou de casse-cou ? De plus, l'assurance privée affronte le problème d'être attrayante pour ceux qui peuvent dissimuler leurs caractéristiques de mauvais risque. Dû à cela, les primes deviennent trop élevées pour les bons risques d'où des coûts d'inefficacité. Enfin, toute assurance peut avoir un impact sur le comportement du client qui tend à négliger les actions préventives.

L'utilité ou le bien-être qu'obtient un individu ne provient pas seulement des seuls produits qu'il consomme. Il a, par exemple, très à cœur les choix disponibles à sa famille immédiate et il est prêt à se sacrifier volontairement pour ses membres. Même si l'intensité des interrelations dans les préférences diminue avec la distance des liens, l'individu peut tout de même vouloir aider ses concitoyens plus démunis soit au moyen d'une aide monétaire ou soit en accroissant les possibilités de consommation jugées prioritaires, tels l'alimentation, l'éducation et les soins de santé.

La redistribution des revenus peut aussi être perçue comme une forme de bien collectif où la contribution de chacun a très peu d'impact, mais où la contribution de tous ceux qui ont un revenu plus élevé qu'un seuil donné implique un effet important. L'action gouvernementale devient alors un mécanisme pour forcer les particuliers à contribuer au bien collectif qu'ils désirent réellement, même si leur bien-être individuel les incite à choisir l'option du resquilleur (*free rider*) qui laisse aux autres le soin de défrayer le coût du bien recherché. Cette dérobade généralisée empêche la réalisation d'une redistribution et justifierait une intervention contraignante du gouvernement.

Enfin, pour mieux comprendre les problèmes et les difficultés que suscitent l'organisation et l'aménagement des services de santé, il faut se référer à l'ignorance relative du consommateur et en dégager les corollaires nombreux qui s'ensuivent concernant les agents économiques que cette industrie rassemble. Qu'il s'agisse du rôle que la société assigne au médecin, des types de relations qu'il établit avec son patient, des conflits d'intérêts dans lesquels il peut se trouver, de son appartenance à un ordre professionnel, qu'il s'agisse du

statut d'institutions à but non lucratif, des hôpitaux, du rôle important qu'assume l'État dans ce secteur, l'explication repose, pour une part, sur le phénomène fondamental de l'impuissance du patient à apprécier le produit qu'il consomme. Une des règles fondamentales de l'efficacité des marchés libres, soit la souveraineté du consommateur, se trouve par le fait même compromise, puisque le client n'est pas complètement en mesure d'exprimer ses préférences.

L'approche des fondements de l'intervention gouvernementale basée sur les défaillances des marchés insiste exclusivement sur le gaspillage et l'inefficacité qu'entraînent les décisions décentralisées. Elle ignore complètement la contrepartie des inefficacités des décisions centralisées : moins grande responsabilité du consommateur, standardisation des services et cartellisation, absence d'expérimentation et de flexibilité, pour n'énumérer que quelques coûts de la centralisation. Ce recours aux défaillances de la décentralisation pour justifier l'intervention gouvernementale ressemble au comportement du légendaire empereur romain. Juge à un concours de chant entre deux personnes, il écouta la première et s'empressa de remettre le prix à la seconde sans s'assurer qu'elle ne faussait pas davantage que la première.

Le gouvernement, une institution substitut

L'initiative privée ne se limite pas simplement aux organismes à but lucratif et aux marchés. Elle comprend toute une gamme d'institutions dont la famille et les organismes religieux ou de bienfaisance. De même, l'entreprise gouvernementale devient une forme institutionnelle en concurrence avec de multiples autres formes. Ainsi, la montée des dépenses gouvernementales dans les trois grands domaines que sont la santé, l'éducation et le bien-être n'apparaît surtout pas comme une substitution à l'entreprise à but lucratif mais plutôt le remplacement par le gouvernement d'activités auparavant davantage à la charge de la famille et des institutions religieuses ou de bienfaisance. On pourrait y ajouter aussi le gouvernement local, d'une façon encore plus importante au Canada anglais.

Placée sous cet angle, la question devient: pourquoi l'entreprise gouvernementale a-t-elle réussi à se substituer aux autres formes d'organisation ? N'était-elle pas devenue relativement plus efficace pour remplir ces fonctions ? Il s'agit de penser à l'impact de l'urbanisation sur la famille qui modifie considérablement le rôle économique à l'intérieur du ménage des enfants et des personnes âgées. Ces dernières étaient relativement moins nombreuses. De plus, la famille assure moins qu'auparavant la sécurité à long terme pour ses membres.

Au Québec, le phénomène qui a été qualifié de révolution tranquille fut le produit ou au moins considérablement influencé par les politiques du gouvernement central et s'est surtout particularisé dans une laïcisation des institutions hospitalières et éducatives. Cette croissance du secteur public québécois depuis le début des années soixante peut avoir été accélérée par ce

que l'historien économique Douglas C. North qualifie de « *ideological conviction* ». L'analyse que fait cet auteur pour la période américaine du *New Deal* ne s'applique-t-elle pas aussi à la révolution tranquille du Québec ?

A . . . period in which ideological conviction played an increased role came with the Depression, when the sharp change in relative prices induced a demand for increased government involvement in the economy. The Roosevelt New Deal was not simply a groping effort to discover a way out of depression. It was characterized by a deep-seated conviction that the market system had failed, was obsolete, and must be replaced. At every level of decision-making this changed perception of the proper role of government was a critical influence in shaping the New Deal. It was not just Roosevelt's brain trust that was made up of individuals with strong commitments to a changed role of the federal government: many executive agencies of government were staffed with zealous young men and women who had considerable latitude in the applications of Congressional policy. They frequently shaped the bureaucracies to become agencies of their convictions and the consequences had enduring implications for the evolving structure of federal control over the economy. Again, the results were a mixture of interest group pressures combined with zealous demands for a new role to be played by the federal government that characterized the three branches of government in the 1930s[1].

Dès le début des années soixante, le sociologue Hubert Guindon avait d'ailleurs perçu ce qui fut qualifié de révolution tranquille comme une révolution bureaucratique orientée vers les intérêts d'une « nouvelle classe moyenne »[2].

Même si la perte d'importance de la famille et de la religion comme institutions centrales de la société a favorisé la croissance du gouvernement, cette dernière peut avoir un effet rétroactif sur les deux premières institutions. Dans le cas de la famille, l'économiste suédois Assar Lindbeck l'a très bien noté comme en témoigne l'extrait suivant :

The negative substitution effects of higher marginal tax rates in favor of do-it-yourself work may fruitfully be compared with the tendency of Welfare State policies to let public institutions take over the care of intimate personal services—of the children, the old and the sick. Thus it would seem that a strong joint effect of the Welfare State Buildup and its financing is that the household sector is stimulated to take care of the servicing of things, while public institutions increasingly take care of intimate personal services like the care of children, old people, the sick and the disabled. In other words, intimate personal services are increasingly socialized whereas the servicing of things is increasingly being transferred from markets to the household sector—in spite of the fact that homes have

1 D.C. North, «The Growth of Government in the United States : An Economic Historian's Perspective», *Journal of Public Economics*, vol. 28, no. 3, déc. 1985, p. 396.

2 H. Guindon, «Social Unrest, Social Class and Québec's Bureaucratic Revolution», *Queen's Quarterly*, vol. LXXI, été 1964, pp. 150–162. R.M. Bird note : « perhaps two thirds of all persons with post-secondary education in Canada—the «elite»—are dependent, directly or indirectly, on the public sector for the bulk of their income.» *Financing Canadian Government : A Quantitative Overview*, Toronto : Canadian Tax Foundation, 1979, p. 85.

traditionally been regarded as the "natural" institution just for intimate personal services[3].

L'État-providence a modifié de façon considérable la division du travail entre les ménages, les marchés et les organismes gouvernementaux. Il n'a pas nationalisé le secteur manufacturier mais il a plutôt touché aux services produits par les ménages. L'obtention de l'aide gouvernementale est souvent rattachée à l'institutionnalisation des personnes impliquées (enfants, vieillards ou personnes handicapées). La prise en charge de ces personnes par la famille est découragée. C'est la même situation en éducation. La formation dans des institutions publiques est très largement subventionnée contrairement à la formation sur le tas. L'exception récente à ce phénomène a été la désinstitutionalisation d'un nombre élevé d'handicapés mentaux.

Certaines politiques impliquent une forme de taxe envers la famille traditionnelle. Par exemple, l'aide sociale rend moins onéreuse la séparation et encourage le « concubinage au noir » pour éviter une baisse dans les prestations. Le nombre de familles monoparentales est en effet sensible à la générosité de l'aide sociale. Ceci est confirmé par une étude récente qui estime qu'une hausse de 10 pour cent des barèmes au Québec provoquerait un accroissement de cette clientèle de près de 15 pour cent[4]. Parallèlement les dispositions de l'impôt sur le revenu du particulier découragent le mariage des personnes qui ont des enfants à leur charge.

L'économique des processus politiques

L'intervention politique, quelle que soit sa forme, résulte du jeu politique. Il est donc essentiel d'analyser le marché politique si on veut expliquer la croissance du secteur public et son omniprésence. D'ailleurs un nombre grandissant d'économistes s'y consacrent depuis environ vingt-cinq ans. Ils utilisent la méthodologie économique traditionnelle, c'est-à-dire l'identification d'agents économiques à la poursuite de leurs propres intérêts, pour expliquer les phénomènes réservés antérieurement à la science politique[5].

Dans la détermination de la consommation des produits passant par le marché, c'est la variable revenu moyen de la population qui a un rôle important. D'autre part, l'expression des volontés par le vote favorise la réalisation des préférences de celui qui se situe à la médiane. Ainsi la différence entre le vote sur le marché avec des billets verts et la règle d'une personne—un vote implique un déplacement de l'équilibre de revenu moyen à celui du revenu

3 A. Lindbeck, *Work Disincentive in the Welfare State* (Seminar Paper no. 164), Stockholm : Institute for International Economic Studies, University of Stockholm, déc. 1980, p. 18.

4 B. Fortin, *Dependence on Public Assistance in the Presence of Unemployment Insurance : A Theoretical and Empirical Investigation*, Cahier de recherche 8304, Québec : Université Laval, Département d'économique, mai 1983, p. 26.

5 Pour un excellent résumé de l'économique des processus politiques, voir J.L. Migué, «Regard d'économiste sur le secteur public», *Revue française de Finances publiques*, no. 16, 1986, pp. 119–136.

médian qui est généralement inférieur au premier par un ordre de 15 à 25 pour cent pour les provinces canadiennes.

Cette proposition a d'importantes conséquences. Tout ce qui diminue le rapport du revenu du voteur médian sur le revenu moyen favorise une croissance de la taille du gouvernement. Ainsi l'extension du droit de vote qui abaissait le revenu relatif du voteur médian a été favorable à l'expansion du secteur public. Dans les années soixante, la diminution de l'âge moyen des voteurs occasionnée par la baisse de l'âge minimum pour voter et l'impact du *baby boom* n'aurait-elle pas ainsi favorisé la croissance des gouvernements ? Parallèlement, le vieillissement de la population ne provoquera-t-il pas un recours plus important à une taxation sur les salaires à la place de la taxation du rendement des épargnes ? Ceci est d'ailleurs très bien commencé. Il existe toutefois un frein aux politiques redistributives demandées par le voteur médian et qui provoquent l'expansion du secteur public. Elles diminuent en effet la productivité de l'économie ou, dans une forme plus imagée, la grosseur du gâteau à se partager.

Ce modèle a été appliqué à la socialisation de l'assurance-maladie au Canada[6]. En se concentrant sur la variable du rapport du revenu médian sur le revenu moyen pour les différentes provinces et le Canada, un chercheur veut expliquer les phénomènes suivants: la socialisation initiale par la Saskatchewan, sa généralisation dans les autres provinces seulement après le partage fédéral des coûts et la présence de quelques caractéristiques qui peuvent s'apparenter à l'assurance privée, tels le financement à l'aide de primes et la surfacturation. Bien sûr, le modèle n'explique pas tout mais la variable du rapport relatif des revenus médian et moyen paraît avoir un rôle non négligeable. Les rapports relatifs étaient en effet les plus bas pour la Saskatchewan et l'ensemble du Canada.

Le théorème du voteur médian repose sur deux hypothèses : absence de commerce de votes entre les citoyens et coûts nuls de participation aux processus politiques. Il est maintenant utile d'étudier les effets d'un relâchement de ces deux conditions. Si le marché politique fonctionne parfaitement, c'est-à-dire s'il n'en coûte rien aux citoyens pour bien révéler l'intensité de leurs préférences, un résultat efficace est alors obtenu. Dans ce marché, comme dans le marché traditionnel, on retrouve les bienfaits de la concurrence. Malheureusement, dans la réalité, le processus d'explicitation des préférences comporte des coûts qui permettent à différentes minorités bien organisées, y compris la bureaucratie gouvernementale, de faire incliner les décisions politiques en leur faveur.

Les coûts d'information et de participation politique expliquent le phénomène assez généralisé de la majorité silencieuse. Pour chaque membre de cette majorité, l'action politique est trop coûteuse pour le bénéfice qu'il peut

6 L.S. Wilson, «The Socialization of Medical Insurance in Canada», *Canada Journal of Economics*, vol. XVIII, no. 2, mai 1985, pp. 355–376.

personnellement en retirer. Ce n'est toutefois pas le cas pour les individus fortement concernés par une mesure gouvernementale: pour cette minorité agissante, les bénéfices attendus de la participation aux processus politiques dépassent les coûts.

Le jeu politique favorise donc le saupoudrage ainsi que des incohérences dans les interventions gouvernementales. D'un côté, les gouvernements ont développé des programmes variés de subventions à l'entreprise, et de l'autre ils la taxent avec l'impôt sur le revenu des sociétés. Il en est de même pour les exportations canadiennes. Par sa politique protectionniste, le gouvernement restreint les importations et par ricochet les exportations. D'un autre côté, il aide ces dernières par différents moyens comme les subventions reliées au financement des exportations et aussi à leur transport. Parallèlement, durant longtemps, les gouvernements ont à la fois encouragé la diminution de l'usage du tabac, tout en subventionnant sa production. C'est aussi le cas pour la consommation du lait où le gouvernement québécois est intervenu pour encourager sa consommation dans les écoles, tout en augmentant son prix par l'organisme de la Régie des marchés agricoles.

Si les coûts d'information et de participation politique peuvent expliquer que les bénéfices de différentes mesures du secteur public soient concentrés en faveur des minorités bien organisées et vociférantes aux dépens d'une majorité rationnellement silencieuse, il est permis de déduire la proposition suivante, qui peut surprendre : l'importance plus considérable des personnes âgées dans la population peut ne pas favoriser leurs intérêts parce qu'en devenant moins minoritaires, elles pourront moins « exploiter » la majorité. Dans un marché politique imparfait, il est important de ne pas être important.

L'expansion considérable du secteur public au vingtième siècle a été concomitante avec la plus grande spécialisation des tâches qui a multiplié les groupes d'intérêts spécialisés. Il y a un siècle, plus de cinquante pour cent des emplois étaient dans le secteur primaire, principalement en agriculture. Cette diversification de la structure socio-économique a multiplié les groupes minoritaires qui quémandent des mesures gouvernementales en leur faveur. La redistribution serait par conséquent moins verticale entre grandes classes de revenus, c'est-à-dire des riches aux pauvres mais prendrait de plus en plus l'aspect horizontal fragmentaire en faveur de minorités mouvantes.

Même si le résultat engendré par les règles du jeu politique implique du gaspillage, ce dernier n'est en lui-même recherché par personne. S'il n'y a aucun gagnant à la réduction du gâteau ou de la richesse collective, cette réduction n'aura sûrement pas lieu. C'est ce qui fait dire à Becker : « If the *intent* of public policies were fully known, I am confident that the public sector would be revealed to be a far more efficient producer and redistributor than is popularly believed »[7].

7 G.S. Becker, «Public Policies, Pressure Groups and Dead Weight Costs», *Journal of Public Economics*, vol. 28, no. 3, déc. 1985, p. 338.

Les facteurs non institutionnels

Malgré l'importance de ces facteurs qui peuvent être qualifiés d'institutionnels, il ne faut pas, pour expliquer la croissance du secteur public, ignorer les autres variables auxquelles s'intéressent les études de marché et les analyses microéconomiques traditionnelles. Ce sont les prix, le revenu et la population.

L'évolution des prix relatifs des services gouvernementaux ne pourrait-elle pas expliquer une partie de la croissance relative des dépenses gouvernementales dans l'économie ? Avant de répondre à cette question, il est utile d'étudier l'évolution relative de l'ensemble des services sur le total des biens. L'expression tertiarisation de l'économie est souvent employée pour exprimer l'importance relative croissante des services dans l'économie. Ainsi, au Canada, la valeur de la production des services représentait 47 pour cent de produit intérieur brut au coût des facteurs en 1951 contre 63 pour cent en 1981. Parallèlement, l'emploi dans les services est passé de 54 pour cent de l'emploi total en 1951 à 67 pour cent en 1981. Toutefois, ces données ne peuvent-elles pas fournir une image déformée de l'évolution relative de la production ? Comme les dépenses sont par définition le produit du volume de la production par le prix, la croissance de la part des services dans l'économie peut être la conséquence, non pas d'un volume relatif de production plus considérable, mais plutôt de coûts relatifs croissants. C'est bien ce qui est arrivé puisque, pour la période de 1935 à 1980, le taux annuel de croissance de production des services (4,7 pour cent) a été approximativement égal à celui des biens (4,6 pour cent).

Est-ce aussi le cas pour les dépenses gouvernementales, du moins si on se limite aux dépenses en biens et services ? Ces dernières totalisaient 13,1 pour cent de la production en 1950 contre 22,8 pour cent en 1980. Cette expansion reflète-t-elle un volume de production relativement plus élevé par rapport au reste de l'économie ou des prix relatifs plus élevés ? Les indices implicites des prix de la dépense nationale brute aident à répondre à cette question. Durant la période de 1950 à 1980, le taux annuel moyen d'augmentation de l'indice des prix des dépenses publiques courantes en biens et services a été de 6,99 pour cent, taux bien supérieur à celui de 4,95 pour cent pour l'ensemble de la dépense nationale brute. Cette différence des taux est importante puisque, si les dépenses gouvernementales et la dépense nationale brute de 1950 sont simplement ajustées aux prix de 1980, la part des dépenses gouvernementales dans l'économie passe de 13,1 à 22,9 pour cent. L'expansion de la part des dépenses gouvernementales en biens et services par rapport à la dépense nationale brute serait donc entièrement la conséquence de prix relatifs croissants des dépenses publiques.

Il ne faut toutefois pas donner à cette décomposition comptable l'importance qu'elle n'a pas. Une augmentation de prix relatifs n'a un effet correspondant sur le volume relatif des dépenses que si la quantité demandée ne change pas. Si on utilise une élasticité-prix (avec revenu compensé) de 0,4 le facteur prix expliquerait un peu plus de soixante pour cent de la croissance de la part des dépenses gouvernementales en biens et services dans l'économie. Les deux

autres facteurs, revenu et population, ne peuvent expliquer la part croissante des dépenses gouvernementales dans l'économie. L'effet revenu justifierait une part constante, et l'élasticité des dépenses gouvernementales par tête par rapport à la population ne semble pas significativement différente de zéro.

PROBLEMES RELIÉS A L'OMNIPRÉSENCE GOUVERNEMENTALE

La croissance récente des dépenses gouvernementales est un phénomène social majeur et la première partie de ce texte a passé en revue différentes voies d'explication avancées par les économistes. Il s'agit maintenant d'indiquer quelques difficultés importantes que cette croissance provoque et qui peuvent la ralentir appréciablement. Pour ce faire, nous nous limitons à trois thèmes : la croissance des coûts d'inefficacité des taxes, l'impact net incertain des politiques de redistribution et les défaillances de la production bureaucratique.

La croissance des coûts d'inefficacité des taxes

L'analyse économique distingue deux aspects aux coûts de la taxation. Le premier, inhérent à toute taxe, est le transfert du pouvoir d'achat des citoyens à leur gouvernement. Ce coût ne peut être évité parce qu'il est intrinsèque à toute taxation. Le deuxième coût est le coût excédentaire de la taxe qui, en modifiant le système de sanctions et de récompenses auquel font face les agents économiques, provoque de l'inefficacité ou du gaspillage dans l'économie. Ce coût comprend aussi les coûts d'administration du percepteur et d'acquittement du contribuable. Pour un montant donné de recettes, le fardeau excédentaire ou le coût d'inefficacité varient entre les différentes taxes selon l'importance de l'effet de distorsion du système d'incitations et aussi selon la sensibilité des réactions des agents économiques, consommateurs et producteurs.

Les estimés des coûts de la taxation ont bien changé depuis trente ans. A la fin des années cinquante, le système de taxation n'était pas perçu comme une source importante de gaspillage. Soit à cause de leurs préférences, soit parce que l'environnement dans lequel ils opéraient permettait peu de substitution ou de choix, les agents économiques apparaissaient peu affectés par les taxes.

Les coûts d'inefficacité des taxes apparaissent maintenant fort élevés. Le seul estimé présentement disponible pour le Québec provient d'un travail fouillé dans le cadre du *Livre blanc sur la fiscalité des particuliers* et se résume ainsi :

> chaque dollar additionnel prélevé à l'aide d'une moyenne pondérée des taxes et redistribué en transferts universels à la population coûterait non pas $1 mais $1,55. Le $0,55 supplémentaire représentant les coûts d'inefficacité, constitue une perte pour l'ensemble de la population. Compte tenu de leur importance, il serait urgent, du point de vue normatif, de tenir compte des coûts d'inefficacité des taxes explicites et implicites

qui prévalent au Québec, dans les analyses bénéfices-coûts des dépenses gouvernementales[8].

Il existe différentes voies d'explication de la montée considérable des estimés des coûts d'inefficacité du système de taxation. Les trois principales m'apparaissent la croissance de l'importance relative du gouvernement dans l'économie, les coûts de plus en plus élevés à mesure que les agents économiques ont le temps de s'ajuster à la taxation élevée et enfin le caractère très discriminatoire du système de taxation entre les différentes activités économiques.

Pour financer un secteur public qui s'accapare maintenant la moitié de la production, il est nécessaire de fixer pour la très grande majorité de la population des taux élevés de taxation sur les mille derniers dollars gagnés. Ces taux s'appellent les taux marginaux de taxation. Ces taux élevés ne peuvent pas être limités aux seuls contribuables riches à cause d'un très grave défaut de ces derniers : leur nombre n'est malheureusement pas très élevé. Une taxation accrue des millionnaires rapporte très peu au fisc parce qu'ils ne forment qu'un très petit groupe. Ils peuvent de plus décider de fuir les endroits à taxation élevée.

Comme la taxation est omniprésente dans nos sociétés, il est très facile de multiplier les exemples où elle modifie les choix des agents économiques et implique ainsi un coût excédentaire d'inefficacité ou de gaspillage. Les choix sont fort variés : choix entre loisir et travail, entre consommation présente et épargne, entre différents biens de consommation, choix entre différentes formes de rémunération, de placements, d'investissements, de modes d'organisation et de financement, choix entre sécurité et risque, entre différentes techniques et lieux de production.

Le résultat théorique qui est encore le plus utilisé aujourd'hui fut initialement dérivé en 1844 par l'ingénieur-économiste français, Jules Dupuit : «si on triple l'impôt, l'utilité perdue devient neuf fois plus considérable . . . . Plus les taxes sont fortes, moins elles produisent relativement. L'utilité perdue croît comme le quarré de la taxe»[9]. Comme les coûts d'inefficacité de taxes croissent plus rapidement que le taux moyen de taxation, il est donc permis de conclure que l'importance des coûts de gaspillage de la taxation a beaucoup augmenté au cours des dernières décennies avec l'importance accrue des dépenses publiques dans l'économie.

Si les taux de taxation élevés découragent l'effort au travail et ralentissent certaines activités, puisque le gouvernement s'accapare une part importante des gains, ceci ne veut pas dire que l'effet se produit instantanément. A court terme, les contribuables ne modifient pas sensiblement leurs comportements suite à

8 B. Fortin, *Offre de travail et coût d'inefficacité de la fiscalité et des transferts au Québec*, Conférence c8503, Québec : Département d'économique, Université Laval, mai 1985, p. 10.
9 J. Dupuit, «De la mesure de l'utilité des travaux publics», *Annales des Ponts et Chaussées*, vol. 8, no. 116, 1844, p. 374.

une hausse des taxes. Cependant, avec le temps, les modes de travail en incluant le «travail au noir», la longueur de la semaine de travail, les conditions de travail s'ajustent aux taux élevés de taxation. A long terme, l'effet est plus important parce que les comportements sont plus flexibles : les habitudes changent avec le temps.

Un grand thème souvent développé par les intellectuels de nos sociétés est la coupure entre la jeune génération et ses aînés sur la place du travail dans la vie. Cette génération serait en effet beaucoup moins orientée vers le travail mais davantage vers la plénitude de la vie. S'il existe un tel changement de comportements, il faut moins en trouver les raisons dans les préférences nouvelles des citoyens mais plutôt dans le régime d'incitations auquel ils sont soumis. Les nouveaux venus peuvent plus facilement s'adapter aux nouvelles règles du jeu, qui comprennent entre autres des taux de taxation très élevés. Pourquoi rechercher des revenus monétaires plus élevés, si on doit en donner une part plus considérable à l'État ?

Le système de taxation actuel incite les personnes à recevoir leurs revenus sous d'autres formes que monétaires. Cette substitution peut ne pas être importante sur le moment mais se réalise lentement à mesure que les taux de taxation croissent. Comme les conditions non monétaires de travail ne sont pas taxées, l'individu est de plus en plus incité à privilégier ces aspects non monétaires de sa rémunération comme un compte de dépenses bien garni, des possibilités de voyages, une plus grande autonomie dans le travail, des vacances plus longues, une place de stationnement fournie gratuitement, etc. Tous ces ajustements pour réduire le fardeau fiscal du contribuable qui peuvent même mener à des actes illégaux ont toutefois comme conséquence d'accroître les coûts d'inefficacité de la perception par le fisc d'un niveau donné de recettes. Pour obtenir un montant donné, ces ajustements forcent les autorités à accroître les taux de taxation puisque la base d'imposition est réduite par l'action du contribuable.

En plus de leur taux moyen élevé, les taxes ont le défaut d'exercer une discrimination entre les différentes activités économiques. Même si des différences de taux peuvent être justifiées en certaines circonstances comme les taux plus élevés sur l'alcool et le tabac et pour les taxes servant à la tarification des services publics, il n'en demeure pas moins que le présent système fiscal incorpore une multitude de privilèges fiscaux qui sont sources de gaspillage. Les privilèges fiscaux modifient donc l'affectation des ressources en augmentant artificiellement l'attrait de certaines activités et ils font aussi de la discrimination entre les contribuables qui ont une même capacité de payer. De plus, la multiplication des privilèges fiscaux complique énormément la perception des taxes. Il devient vite profitable au contribuable de recourir à des spécialistes en planification fiscale pour profiter au maximum des réductions d'impôts possibles.

L'importance qui est ici accordée aux coûts élevés des accroissements de taxes se justifie par leur rôle probable dans la remise en question de l'État. Ils

viennent contraindre de plus en plus fortement l'expansion des dépenses gouvernementales.

L'impact net incertain des politiques de redistribution

Le secteur public peut s'attribuer un rôle important dans la modification de la répartition des revenus pour aider les plus démunis et aussi pour assurer à la population en général une protection de revenu contre les risques socio-économiques. D'ailleurs, beaucoup de programmes gouvernementaux, si ce n'est la très grande majorité, sont mis en œuvre pour leurs effets redistributifs. Ils s'agit, par différents moyens, d'enlever à certains pour donner à d'autres.

Malheureusement, il est très difficile d'estimer avec un minimum de précision l'impact net des différentes interventions gouvernementales en ce domaine, et cela pour différentes raisons, comme la diminution indirecte de la charité privée et des solidarités familiales, et les modifications au système de sanctions et de récompenses qu'affrontent les agents économiques, tels les hauts niveaux, explicites ou implicites, de taxation et même les incitations à la fraude. Toutefois, une hypothèse assez répandue veut que les mesures de redistribution aient été peu favorables au quintile le plus pauvre de la population—qui était d'ailleurs auparavant la grande préoccupation de la charité privée—pour avoir des effets bénéfiques sur la classe moyenne que forment les deux quintiles suivants.

L'impact net incertain ou indéterminé des politiques de redistribution peut être la conséquence des actions contradictoires des gouvernements qui opèrent des transferts de richesse dans une suite illimitée de coalitions successives. C'est en effet le sens du théorème dit de l'impossibilité qui a contribué à valoir le prix Nobel d'économique à son auteur, Kenneth Arrow. Il établit qu'il est impossible de concevoir une proposition, une politique ou un ensemble de politiques qui l'emporte incontestablement sur tous les autres dans un régime de scrutin majoritaire. En d'autres termes, pour chaque coalition majoritairement favorable à une décision particulière, on peut toujours concevoir une proposition différente qui l'emportera sur la précédente dans une coalition également majoritaire.

Par conséquent, il n'est donc pas inconcevable qu'une part importante de l'activité politique de nos régimes ne serve en fin de compte qu'à opérer des transferts entre des coalitions majoritaires successives. Dans cette dernière perspective, le régime de scrutin majoritaire devient un simple mécanisme ayant pour effet de générer ce que l'économiste désigne comme des économies externes. Puisque les membres d'une coalition majoritaire effectuent leurs choix budgétaires en fonction du coût qu'ils ont chacun à porter comme membres de la majorité, plutôt qu'en fonction du fardeau qui échoit à l'ensemble de la population, il s'ensuit qu'ils se retrouvent en position de transférer à leurs voisins une partie du coût de leur choix. En conséquence, les membres de la coalition majoritaire choisiront un niveau de budget excessivement élevé ou excessivement faible sans incorporer dans leur calcul les

bénéfices ou les coûts qu'ils imputent à leurs voisins. À la limite, ils ne font qu'opérer de simples transferts.

Les défaillances de la production bureaucratique

Il existe au moins deux sources de différences majeures entre l'entreprise privée et l'entreprise publique : la première réfère aux droits de propriété des entreprises et la seconde aux types de demandes qu'affrontent les deux formes d'entreprises.

Dans une entreprise privée ordinaire, les actionnaires possèdent un droit de propriété sur les profits de l'entreprise. Ce droit n'est toutefois pas complet puisque les gouvernements s'accaparent une partie non négligeable des profits par l'impôt sur le revenu des sociétés. Néanmoins, la valeur de leurs titres, soit les actions, dépend directement des profits attendus de l'entreprise. Les actionnaires ont donc tout intérêt à ce que la firme maximise ses profits. Dans les institutions sans but lucratif, aucun groupe n'a intérêt à favoriser la réalisation de profits puisque le droit de propriété sur ces profits n'existe pas. Les profits potentiels seront donc dissipés ou transformés en bénéfices non monétaires par des dépenses plus élevées sur différents objets.

Une différence majeure entre l'entreprise privée et publique provient donc de la place des profits dans l'organisation. Pour l'entreprise à but lucratif, les profits sont le critère de performance et à ce titre ils orientent tout le système de contrôle qui est développé pour que les différentes parties de l'organisation ne se dérobent pas à l'objectif collectif. Ils doivent être la préoccupation de toutes les unités de décision. La marge discrétionnaire des administrateurs s'en trouve donc rétrécie d'autant.

Bien entendu, dans l'entreprise publique, les profits ne jouent pas ce rôle central. Ainsi pour éviter que les différentes unités à l'intérieur de l'organisation fassent passer leurs intérêts avant l'intérêt collectif, on aura recours à des règles ou règlements explicites. Ces derniers, qui spécifient pour les unités subalternes les comportements jugés acceptables, sont davantage orientés vers le contrôle détaillé et tatillon de l'usage des différents facteurs de production, que vers la mesure des effets des actions sur la production et la rentabilité de l'entreprise. Il en résulte beaucoup de paperasse avec la multiplication des formulaires à remplir en de nombreux exemplaires et aussi une propension très grande pour les différentes unités à jouer le livre afin d'éviter les risques. Pourquoi faudrait-il faire les efforts nécessaires à l'accroissement de l'efficacité, si cela n'est pas payant, si le succès n'est pas reconnu, ni récompensé ou l'est mal ? Il est préférable de jouer conservateur et de multiplier les décisions de comités qui diffusent ou cachent très bien les responsabilités. Ce type de raisonnement n'est pas absent de l'entreprise privée ; cependant, il y est moins présent puisque le profit est la mesure de réussite de l'entreprise et devient ainsi l'objet central des préoccupations des différentes unités de la firme.

En plus de se caractériser par une différence au niveau des droits de propriété, les entreprises privées et publiques font face à des demandes de

nature différente. Dans les marchés ordinaires, les consommateurs expriment leurs préférences variées pour les diverses caractéristiques d'un produit. Il y va de l'intérêt des producteurs d'adapter leurs produits aux préférences de ces consommateurs et souvent de fournir, comme c'est le cas pour l'automobile, une grande variété d'un même bien pour satisfaire différentes clientèles. Bien sûr, il existe une demande pour la production de l'entreprise publique mais sa formulation est de nature différente. C'est une demande collective qui est le résultat des processus politiques. En effet, par le vote et aussi par d'autres moyens comme le *lobbying*, les mémoires, les manifestations, etc., les citoyens expriment aux gouvernements, d'une façon très grossière et très agrégée, l'intensité de leurs préférences.

Ces différences dans l'expression des demandes ont un impact sur l'output des deux types d'institutions. L'institution privée fait directement face à des consommateurs ayant des préférences variées, ce qui l'oblige à porter attention aux différentes caractéristiques de son produit et, très souvent, à le diversifier. Pour sa part, l'institution publique doit s'adapter aux incitations que véhiculent les paramètres de décision du niveau central, niveau qui lui alloue son budget et aussi l'évalue. Ces paramètres se limitent la plupart du temps à quelques caractéristiques du produit et ne peuvent donc pas contenir toute la richesse d'information sur les désirs des consommateurs que contient une demande directe de ces derniers. Le central favorise la standardisation de la production, du moins en ce qui concerne les éléments qu'il surveille en plus de refuser généralement la liberté d'entrée dans le secteur.

De plus, les institutions d'un secteur nationalisé, tel celui de la santé, sont soumises à deux ordres de demandes inconsistantes. D'un côté, les processus politiques révèlent au gouvernement une demande agrégée pour les services de santé. De l'autre, la demande de chaque consommateur n'est pas rationnée par la présence d'un prix direct. Dans ces conditions, il y a très peu de relation entre la quantité demandée par les consommateurs et la demande des citoyens-voteurs. Comment le système peut-il résoudre cette incompatibilité ?

En pratique, la solution de ce problème prend différentes voies. Une première place le consommateur complètement sous la tutelle des producteurs qui décident de l'accès aux services. L'entrée dans les facultés de médecine en est une illustration. D'autre part, il est possible de rationner en élevant le prix indirect d'un service. Le coût au consommateur d'une visite chez le médecin est important s'il est obligé de faire de l'antichambre durant une longue période. Enfin, il est possible de diminuer la quantité demandée en abaissant la qualité du service fourni. Il est alors moins profitable au consommateur de recourir au produit impliqué. C'est ainsi que la liste d'attente devient le mode de rationnement utilisé par les hôpitaux pour les cas non urgents. Comme le délai pour recevoir un produit en réduit sa valeur, la quantité demandée converge vers la quantité offerte non par un accroissement des prix mais par une diminution de la valeur du service retardé.

En somme, le non-recours à un système explicite de prix n'enlève pas la

nécessité de rationner les quantités demandées mais force plutôt à utiliser d'autres mécanismes qui ont des effets redistributifs mal connus et qui sont presque toujours une source de gaspillage comme l'illustre la congestion des routes.

CONCLUSION

Ce texte a passé en revue les différents facteurs suggérés par les économistes pour expliquer l'important phénomène de la croissance rapide du secteur public au cours des dernières décennies, qui est présent à des degrés divers dans tous les pays développés. Ce sont en premier lieu les différentes défaillances des marchés ou des processus décentralisés d'affectation des ressources que la théorie économique a mises en lumière. De plus, la croissance de l'État peut être perçue comme une substitution institutionnelle aux rôles traditionnellement remplis par la famille et la religion, incluant ainsi tous les organismes de bienfaisance. En troisième lieu, comme l'évolution du gouvernement résulte des processus politiques, il est important de s'interroger si ces derniers ont un biais favorable à l'expansion gouvernementale dans un monde où la division de travail entraîne la création d'une multitude de groupes à intérêts spécifiques ou circonscrits. Enfin, les forces technologiques ou la non-standardisation des services publics impliquent des coûts relatifs croissants.

Ce phénomène qu'est l'omniprésence gouvernementale soulève de graves difficultés. Tout d'abord, son financement entraîne des coûts de taxation à la marge très élevée qui fausse le système de sanctions et de récompenses et ceci pour tous les niveaux de revenu. De plus, toutes les décisions même les plus routinières deviennent directement ou indirectement, comme par la taxation, influencées par l'action gouvernementale. Tout est politisé. Dans un tel univers, il est d'un côté difficile de mesurer l'impact net du gouvernement entre les différents groupes de la société et de l'autre, facile d'identifier des programmes dont les effets sont contradictoires. Enfin, la production publique dans un monde non concurrentiel ne favorise pas la production efficace des services, c'est-à-dire en quantité et en qualité correspondant aux demandes de la population et à des coûts non excédentaires ou minimums.

Dans nos démocraties, existe-t-il une limite à l'expansion du secteur public ? L'établissement d'une limite peut être une entreprise dangereuse pour son auteur. En 1945 l'économiste Colin Clark avait indiqué que, pour ne pas générer des pressions inflationnistes, «the critical limit of taxation is about 25 per cent of national income, or possibly rather less»[10]. Harold Demsetz est sûrement plus près de la réalité en concluant :

An equilibrating process seems to be at work, but it is based on two mechanisms,

10 C. Clark, «Public Finance and Changes in the Value of Money», *Economic Journal*, vol. LV, no. 220, déc. 1945, p. 376.

political opposition at the polls and avoidance of taxes through underground transactions. Underground economies as large as those that have developed recently are relatively new upon the democratic scene, precisely because relatively large government sectors in democracies are a post World War II phenomenon . . . .

This suggests that the tolerable range of contemporary real government sectors in democracies is contained between 30 and 45 percent of total real GNP. In a more peaceful world, the upper limit might be still lower, perhaps under 40 percent of real GNP[11].

Cependant, son PNB inclut l'économie souterraine qui peut, selon lui, représenter plus de vingt-cinq pour cent de PNB officiel pour les pays avec des secteurs gouvernementaux relativement importants.

Demsetz termine son texte en soulevant une large question qui mérite d'être reprise à titre de conclusion :

There is not yet enough experience to determine whether democratic political institutions are compatible with governments as large as 40 percent of real GNP. The politics of confrontation seems to characterize organized political competition when the government sector gets that large. Organized groups are not much inclined to take the political parameters of democracy as a given and beyond their control. This form of competition may turn out to be too disruptive to remain within the bounds of stable democratic institutions[12].

11 H. Demsetz, *Economic, Legal, and Political Dimensions of Competition*, Amsterdam : North Holland Publishing, 1982, pp. 121–123.

12 *id.*, pp. 123–4. Voir aussi D. Usher, *The Economic Prerequisite to Democracy*, New York : Columbia Unversity Press, 1981, 160 p.

JEAN-MARIE GAGNON, S.R.C.*

La théorie de l'agence et l'entreprise†

DEPUIS QUELQUES ANNÉS, ceux qui s'intéressent à l'économie de la firme et, notamment, aux modèles financiers rencontrent de plus en plus les termes théorie et coûts de l'agence. Nous proposons ici un bref aperçu des principaux concepts, de l'importance et des limites de cette voie de réflexion. La conclusion rappellera l'une des prédictions qu'elle suggère à l'égard de l'évolution de notre société.

LES ACTEURS ET LEUR COMPORTEMENT

La théorie de l'agence s'intéresse à deux groupes de personnes qui jouent des rôles importants dans les organisations commerciales[1]: les mandants ou actionnaires, et les mandataires, ou cadres supérieurs.

La contribution des premiers prend la forme de fonds que l'on appelle externes parce qu'elle n'est pas accompagnée d'un concours à la gestion de l'entreprise. L'apport en capital des administrateurs, qui peut être minime dans les grandes organisations, est dit interne[2].

On suppose que chacun des deux groupes, propriétaires du capital externe

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1 Les relations d'agence se retrouvent également dans les organisations sans but lucratif. Malgré leur intérêt, ce texte n'en tiendra pas compte.

2 On superpose la distinction traditionnelle entre dettes et fonds propres et la plus récente entre capitaux internes et externes. Toutefois, la première semble perdre une partie de sa signification économique lorsqu'elle est appliquée aux fonds internes. Les créanciers externes exigent, en général, que les droits des créanciers-gestionnaires soient subordonnés aux leurs. Nous allons supposer que tous les capitaux d'emprunt sont externes, mais non l'inverse.

d'une part, et gestionnaires d'autre part, poursuivra ses fins propres. Le premier, croit-on, souhaite que soit maximisée la valeur marchande de ses actions. Le second tente plutôt de maximiser sa rémunération, directe et indirecte, pour un effort donné. L'étude de la gestion du conflit d'intérêt qui surgit entre les deux groupes fait l'objet de la théorie de l'agence.

LES ANTICIPATIONS RATIONNELLES

Le modèle prête à tous les participants des anticipations rationnelles. Cette expression signifie que tout agent économique prévoit les actions et réactions de ses concurrents et partenaires. Les prévisions sont fondées sur la théorie économique pertinente. Non seulement chacun la connaît mais encore sait que les autres agents économiques la connaissent également. Ainsi donc, le mandant et le mandataire veulent maximiser leur bien-être à partir de ressources communes et prennent les mesures nécessaires à l'atteinte de ces objectifs conflictuels.

Faute d'un meilleur terme, on peut qualifier "d'opportuniste" le comportement attribué à chacun. Ce vocable recouvre les deux notions de risque moral et de biais de sélection, qui jouent un grand rôle en théorie de l'assurance. Le premier rappelle le changement de comportement qui caractérise un agent économique dont les responsabilités seront désormais entièrement ou partiellement assumées par une tierce partie : il réduira les efforts qu'il déploierait autrement pour se prémunir contre les risques liés à ses actions. Les gestionnaires partagent cette inclination. Ils pourront modifier sensiblement leur conduite s'ils se départissent d'une partie du capital-actions de l'entreprise. Le terme biais de sélection rappelle que les agents les plus susceptibles de transférer leurs risques à un assureur sont précisément ceux qui occupent les positions ou posent les gestes les plus dangereux. De la même façon, on peut croire que les gestionnaires qui remettent au marché des capitaux une partie de leurs risques, c'est-à-dire ceux qui font appel au capital externe, sont aussi les plus susceptibles de prendre avantage de cette participation. La théorie de l'agence pose que mandants et mandataires prévoient ces comportements et en tiennent compte.

L'OBJET DE LA THÉORIE DE L'AGENCE

Les contrats d'embauche et d'émission de titres, qui doivent tenir compte des conflits d'intérêts entre mandants et mandataires, sont l'objet de la théorie de l'agence. Dans sa partie positive, elle devrait « expliquer » les conditions d'emploi des cadres supérieurs, les clauses des contrats d'emprunts, les structures financières complexes, la vérification et les normes comptables. Elle s'intéresse également au niveau des dépenses improductives et au choix des investissements, ainsi qu'à leur financement.

DÉPENSES IMPRODUCTIVES

On entend par dépenses improductives les charges liées aux conditions d'emploi des administrateurs : nombre d'adjoints, luxe des bureaux, frais de voyage, etc. Certaines d'entre elles, comme le prestige lié à la direction d'une firme importante, procurent au bénéficiaire un revenu « en nature » qu'il pourrait difficilement monnayer sur le marché du travail. Il en va de même pour la popularité dont peut jouir un « bon » patron, tant au sein de l'entreprise que dans la société en général. Ces revenus non monétaires peuvent être acquis au détriment du taux de rendement du capital.

Ce n'est pas le montant absolu des dépenses qui importe, mais plutôt la différence entre le montant réellement engagé et celui qui le serait si le seul objectif de l'entreprise était la maximisation de sa valeur marchande. Le scénario proposé est le suivant. Un gestionnaire d'une société dont il possède tout le capital peut établir à sa convenance le niveau des dépenses. Les ressources qui leur sont consacrées seront nécessairement distraites des salaires, dividendes et gains en capital. Mais, en l'absence d'impôt, le mode de rémunération n'a pas d'importance, puisque le gestionnaire possède tout l'avoir propre. En dernière analyse, la dépense lui est imputée, quelle que soit sa forme. Supposons maintenant que ce propriétaire-gérant fasse appel au capital-actions externe. S'il vend, par exemple, 20 pour cent de sa participation, les dépenses excédentaires qu'il engagera désormais seront payées par ses copropriétaires dans cette proportion. Il est donc plausible que leur niveau augmentera[3].

Peut-être n'est-il pas superflu d'insister sur le caractère particulier des dépenses qui nous occupent ici. Un marché du travail parfaitement concurrentiel ajusterait la rémunération globale du gestionnaire de telle sorte qu'elle soit égale à sa contribution marginale au profit de l'organisation. Il tiendrait compte de tous les éléments qu'elle comporte, y compris les prélèvements en nature[4]. Toutes choses égales par ailleurs, ces derniers auraient une utilité moindre, parce que celui qui les reçoit ne peut les consommer à sa guise. Dans ce cas, les charges improductives sont contrôlées et ne méritent pas une attention particulière. Celles que retient d'abord la théorie de l'agence sont indissociables du contrôle de l'organisation et ne peuvent être facilement monnayées.

LE CHOIX DES INVESTISSEMENTS ET LEUR RISQUE

La théorie de l'agence pose également que la jonction de projets risqués et

3 Ceci ne signifie pas que les nouveaux actionnaires sont dupes. Au contraire, la théorie postule qu'ils déduiront du prix offert pour les actions la valeur capitalisée de l'accroissement des dépenses improductives appréhendées. Le droit aux prélèvements est lié au contrôle de l'entreprise, auquel il donne une valeur économique.

4 L'impôt sur le revenu peut induire une certaine préférence pour les formes de rémunération qui lui échappent. Dans l'ensemble, il renforcera les comportements que prévoit la théorie de l'agence.

d'une proportion élevée de capital externe peut influer sur le comportement des administrateurs. En effet, elle induit une asymétrie importante dans l'attribution des résultats. La distribution de probabilité du produit d'un investissement risqué comporte à la fois des possibilités de gains importants et de pertes élevées. D'autre part, les fonds externes qui prennant la forme de capitaux d'emprunt voient la limite supérieure de leur rémunération fixée par contrat: elle ne peut dépasser le taux d'intérêt convenu. En conséquence, un résultat favorable sera principalement à l'avantage des actionnaires en général, et des propriétaires du capital-actions interne en particulier. Un résultat désastreux pourrait être, en grande partie, absorbé par les créanciers, à cause de la responsabilité limitée des actionnaires. C'est pourquoi l'attrait relatif des projets hautement risqués augmente avec l'importance des capitaux d'emprunt, qui sont d'origine externe.

Il est également concevable que les gestionnaires d'une compagnie dont le ratio d'endettement est relativement élevé puissent mettre au rancart des projets d'investissement rentables. Supposons que la valeur de l'entreprise soit inférieure au principal de ses dettes. Dans ce cas, un projet dont la valeur actualisée nette serait égale ou inférieure à la valeur du déficit accumulé ne bénéficierait qu'aux créanciers. Il est donc possible que les gestionnaires décident de ne point le réaliser.

UNE CONSÉQUENCE IMPORTANTE : LE BESOIN D'INFORMATION

La théorie de l'agence a pour objet l'étude des contrats qui doivent contrôler les comportements que nous venons de rencontrer. Il s'ensuit qu'elle devra accorder une grande importance à l'économie de l'information. S'il était possible d'observer directement les efforts des gestionnaires, le problème serait relativement simple. Mais, en général, cela ne sera pas suffisant. Il faudra plutôt porter jugement à partir des résultats. Or l'économie de l'incertain, et la théorie financière en particulier, ont montré que le produit d'une opération dépend non seulement des efforts du gestionnaire mais aussi d'aléas hors de son contrôle[5]. L'information fournie aux propriétaires du capital externe devrait leur permettre d'évaluer l'importance relative de chacun de ces éléments. Ainsi se trouve placée sous un nouvel éclairage l'information comptable. Idéalement, elle devrait à la fois influer sur les gestionnaires de telle façon qu'ils adoptent les comportements souhaités et permettre d'attribuer les résultats à leurs sources. Elle fait également partie des frais de surveillance et de contrôle qu'il faudra engager pour assurer et vérifier le respect des ententes.

5 Ces notions sont très rapprochées de celles que l'on retrouve en théorie financière, qui distingue le risque systématique, lié à l'évolution de l'ensemble d'un marché, et le risque non systématique, particulier à un titre.

L'APPORT ET L'IMPORTANCE DE LA THÉORIE DE L'AGENCE

Il y a certes lieu de se demander en quoi la théorie de l'agence contribue à notre connaissance des organisations. La distinction entre le contrôle et la propriété des entreprises remonte au moins à 1932, année de la publication du célèbre ouvrage de A. Berle et G. Means. La conception de l'entreprise comme un ensemble de contrats n'est guère nouvelle non plus. Elle constituait l'élément principal d'un article de R. Coase, paru en 1937. Enfin, le conflit d'intérêts entre gestionnaires et propriétaires était latent dans la théorie néoclassique. Il se trouve seulement qu'il ne peut éclater sous la double hypothèse d'un marché parfaitement concurrentiel pour les produits de l'entreprise et les services des administrateurs. Tout comme la théorie néoclassique, la théorie de l'agence suppose que l'objectif de l'entreprise est de maximiser sa valeur. Mais, en plus, elle explicite les contraintes que représentent les frais de transaction, les charges de surveillance et de contrôle, le coût et la disponibilité de l'information. Elle prend également en compte l'analyse du risque développée en théorie financière, et qui permet de distinguer les diverses sources d'un taux de rendement.

L'apport principal de la théorie de l'agence est probablement de remettre l'accent sur les problèmes fondamentaux des organisations. On a sans doute un peu hâtivement expliqué les structures financières par les lois fiscales, et l'existence des vérificateurs par les commissions des valeurs mobilières et autres organismes de réglementation. La théorie de l'agence conclut que l'on observerait ces phénomènes en l'absence de toute intervention gouvernementale dans l'économie. Mais en quoi seraient-ils différents ? C'est là la question intéressante.

Considérons, par exemple, le présent débat sur la réglementation des sociétés et, particulièrement, les établissements financiers. L'abolition du système actuel modifierait-elle leur comportement ? On sait que la loi canadienne des banques contrôle la distribution de leurs actions votantes parmi les épargnants. Nul n'en peut posséder plus de 10 pour cent. Cette prohibition a l'avantage de les mettre à l'abri de la surenchère et des aventuriers. Mais elle a aussi l'inconvénient de protéger les administrateurs en place. Est-on certain que l'avantage soit supérieur au coût ? De plus, les fonds propres des banques ne représentent qu'une partie minime de leur capital. On peut se demander si une réduction du ratio d'endettement, qui transférerait des créanciers aux actionnaires une partie du risque de l'entreprise, ne serait pas une méthode plus efficace de contrôle du comportement des administrateurs que la dispersion du droit de vote. La théorie de l'agence suggère une réponse affirmative.

LES LIMITES DE LA THÉORIE

Les limites de la théorie de l'agence sont d'une importance telle qu'au mieux elles en rendront le développement laborieux.

L'HYPOTHÈSE DE BASE

Notons d'abord que l'hypothèse de départ ne s'impose pas avec une très grande évidence. L'antagonisme qui sépare actionnaires et administrateurs peut être plus apparent que réel. En effet, supposons que les portefeuilles des investisseurs sont très diversifiés. Dans ce cas, l'investissement dans chacune des entreprises peut ne représenter qu'une partie infime du patrimoine de l'épargnant, dont la valeur dépendra plus de l'évolution de l'ensemble du marché que du sort d'une compagnie donnée. Mais les préoccupations d'un cadre supérieur sont tout à fait différentes. La valeur de son « capital humain » est liée à la prospérité de son employeur. Une faillite, ou même un taux de rendement faible, ne favorisent pas son ascension. Par conséquent, les administrateurs d'une société y font un investissement considérable, dont le risque ne peut être réduit par la diversification. Paradoxalement, il est possible qu'ils soient plus enclins que les actionnaires eux-mêmes à maximiser la valeur de l'entreprise. Cette tendance est encore renforcée par les modes de rémunération qui lient cette dernière aux profits et à la valeur boursière des actions.

L'hypothèse que nous venons d'énoncer est précisément l'inverse de celle qu'ont généralement vérifiée les économistes empiriques. Ils ont avancé que l'entreprise contrôlée par ses actionnaires maximiserait sa valeur, mais celle qui l'est par ses cadres diluerait cet objectif avec des contraintes propres à son personnel[6]. On voit donc que l'hypothèse de base elle-même pourrait être formulée de façon différente, et même inversée.

LES TESTS EMPIRIQUES

L'importance relative du capital interne constitue le point de départ de nombreuses études en ce domaine. Pour ce faire, on établit la répartition des droits de vote dans le public. Faute de concentration importante, on suppose que les administrateurs contrôlent la société[7]. Ou encore, on évalue la proportion du capital-actions possédée par les directeurs et gestionnaires[8]. Mais il n'est pas évident que ces nombres soient pertinents. Il faudrait plutôt établir le ratio de son investissement dans la société à la valeur globale de la fortune du gestionnaire-investisseur. De cette façon, on obtiendrait un indicateur valable des forces économiques qui influent sur son comportement. Pour le moment, les recherches dont nous disposons ont été construites à partir de la disponibilité de l'information plutôt que des prescriptions de la théorie.

6 Voir, par exemple, Kamerschen (1968).
7 Voir, par exemple, Hindley (1970).
8 Voir, par exemple, Morck et al. (1986).

LES ENTREPRISES DE GRANDE TAILLE

Ce sont principalement les entreprises de grande dimension qui ont fait l'objet d'études empiriques. C'est là une deuxième conséquence des contraintes attribuables aux coûts de la recherche. Si l'on s'était attaqué aux petites organisations, peut-être aurait-on obtenu des résultats plus convaincants. En effet, une entreprise de taille importante fait depuis longtemps appel aux capitaux externes. Les instruments de contrôle et de surveillance ont été mis en place au début de sa croissance. Il est plausible que la valeur marginale des dépenses improductives liées à un appel supplémentaire au marché des capitaux ne soit pas très importante. Il est d'ailleurs possible que le ratio des dépenses improductives à l'ensemble des frais d'exploitation varie à l'inverse de la taille de l'organisation. Enfin, si le marché du travail pour les administrateurs est fortement concurrentiel, tous les frais improductifs ne sont pas pertinents, mais seulement ceux qui sont indissociables de l'emploi. Ces éléments suggèrent que les entreprises de grande taille constituent le champ de recherche le moins fertile. Surtout, ils pourraient mener à la conclusion que la théorie de l'agence ne développera pas beaucoup notre compréhension du fonctionnement des grandes organisations. Mais, si elle devait nous expliquer les petites, ce serait déjà une importante contribution.

CONCLUSION: UNE PRÉDICTION

En résumé, la théorie de l'agence a déjà fourni un apport appréciable : elle a de nouveau attiré l'attention sur les problèmes fondamentaux du comportement des entreprises. À ce titre, elle peut inspirer des propositions intéressantes. Ainsi, elle suggère l'hypothèse qu'une augmentation significative de la part du capital externe dans le financement des entreprises devrait être accompagnée d'un accroissement du rôle de l'État dans l'économie. Pourquoi ? À mesure que diminue l'importance relative du capital interne, diminue simultanément la part du coût des activités gouvernementales que doivent financer les administrateurs à même leurs revenus personnels. Leurs protestations contre les diverses taxes et la réglementation en seront d'autant moins vigoureuses. Au contraire, ils pourront profiter de ces occasions pour faire preuve de « conscience sociale » et « d'ouverture d'esprit » à l'endroit des pouvoirs publics et syndicaux. Le capital externe fera les frais de cette popularité. En retour, les gouvernements pourront accorder aux administrateurs la protection de lois, comme celle des banques, qui restreignent l'exercice du droit de vote, ou celle des sociétés commerciales, qui permettent l'émission d'actions à droit de vote restreint. Dans ces conditions, il est prévisible que les dépenses improductives augmenteront plus rapidement que les profits et que les entraves à l'extension de l'activité gouvernementale seront de moins en moins importantes. Cette hypothèse doit être acceptée sous réserve de vérification ultérieure, mais elle semble plausible.

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L'évolution du syndicalisme au Canada : Comment un mouvement devient une institution†

AU COURS DU XX^e siècle, le syndicalisme a fortement influencé le mode de vie et l'évolution de la société canadienne. Il a lui-même évolué considérablement. Est-il toujours le défenseur de la justice sociale qui l'a inspiré à ses origines ? C'est ce que nous tenterons d'évoquer en nous demandant s'il est toujours un mouvement ou s'il est devenu une institution.

Au point de départ, rappelons la différence que nous mettons entre un mouvement et une institution. Un mouvement évoque un groupe dynamique, généralement peu structuré, jeune, au moins d'esprit, avec des objectifs et des idéaux nobles et grands. L'institution, au contraire, désigne davantage un corps constitué, structuré, souvent considérable, généralement moins souple et moins dynamique.

Pour nous y retrouver plus facilement, nous distinguerons quatre périodes dans l'évolution du syndicalisme au Canada. (Les dates n'ont qu'une valeur indicative.)

1 La quête de la liberté ou la période d'illégalité : 1825–1875
2 L'exercice de la vie autonome ou la mise en place des organismes de base : 1875–1935
3 La croissance et l'essor, ou la période des privilèges et des conquêtes : 1935–1975
4 La recherche d'une nouvelle identité : depuis 1975.

A. HISTOIRE

Le contexte légal prend une telle importance dans l'évolution du syndicalisme

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TABLEAU I

Évolution du syndicalisme au Canada selon certains contextes et caractéristiques 1825–1985

Contexte ou caractéristique	Période d'illégalité 1825–1875	Organismes de base 1875–1935	Croissance et essor 1935–1975	Hésitations 1975 . . .
Les lois	Droit commun brit. : liberté du commerce	1872 Loi synd. ouvr. 1907 Loi enquête sur différents ouv.	1944 CP 1003, L.R.O. 1967 L.R.T.F. publ. 1975 ret. cot. synd.	1982 6%, 5% Lois prov. de restrictions
L'histoire	1827 Typo. Québec . . . 1850 Unions brit. puis américaines	1883 C.M.T.C. Pér. d'organisation et de reconnaiss.	1935 Synd. industriels 1956 C.T.C. (unité) 1965 Secteur public	Canadianisation Balkanisation
Les membres	Hommes de métiers	Employés de manuf., mines et chem. fer	Production de masse Secteur public	E. des services Professionnels
Regroupements (centrales)	Par régions, métiers	C.M.T.C. Chev. du travail Féd. can. travail . . .	C.M.T.C. (F.A.T.) et C.C.T. (C.I.O.) Unité : C.T.C.	Emiettement
Affiliations	Grande-Bretagne États-Unis	S. internat. : C.M.T.C. Courant canadien	S. intern. en progrès Reprise du cour. can.	S. can. dominent
Mode de recrut. et vie interne	Cellules de base Manifestations	Signature de cartes Efforts de démo. ind.	Croissance soutenue Régime de délégation Recours aux gouvern.	Bureaucratie Désinteress. base Recours trib. gouv.
Objectifs Idéologies	Conditions de trav. Droit d'association	Synd. idéologique Synd. d'affaires	Synd. d'affaires (Synd. radical)	Diversité Orient. divergentes
Nombre (en milliers)		1911 130 8% 1935 280 15%	1945 700 25% 1965 1,500 30%	1975 2,900 37% 1985 3,600 39%
Personnel et budget (approx.)			1971 10,000 empl. b. de 150 millions $	1983 25,000 emp. b. de 900 mill. $

qu'il faut en rappeler les principaux jalons avant même d'évoquer les grandes dates de l'histoire proprement dite. (Le tableau 1 résume les principaux aspects de la démarche historique.)

Le contexte légal

Le Canada n'a jamais adopté de législation bannissant ou interdisant les associations ouvrières—sauf la Nouvelle-Écosse, mais bien avant son entrée dans la Confédération—comme l'a fait la France, avec la Loi Le Chapelier, en 1791, et la Grande-Bretagne avec les Combination Acts, en 1799–1800[1]. Mais l'absence de lois d'interdiction ne rendait pas les associations ouvrières légales pour autant : le droit commun britannique s'appliquait au Canada ; au nom de la liberté de commerce, toute coalition, ouvrière ou autre, était considérée illégale.

C'est en vertu de ce principe que 24 imprimeurs de Toronto furent condamnés, lors de la grève de mars 1872. Le gouvernement de Macdonald s'empressa d'adopter, le 15 juin de la même année, la Loi sur les syndicats ouvriers, qui leur accordait l'existence, à condition de s'enregistrer.

Les lois adoptées au cours des années qui suivirent tantôt favorisaient le développement des associations ouvrières, tantôt restreignaient leur liberté d'action. Une série de lois au début des années 1900 vient réglementer certains conflits ; la plus célèbre, la Loi Lemieux, de 1907, imposait une intervention gouvernementale, généralement de nature conciliatrice, avant que la grève ne soit autorisée dans certains secteurs. Le même principe s'applique encore aujourd'hui.

Mais les lois qui favorisèrent véritablement le développement du syndicalisme datent, aux États-Unis, de 1935 et, au Canada, de 1944. La situation de guerre aidait évidemment en donnant aux ententes patronales-ouvrières un caractère patriotique essentiel. Des lois semblables furent adoptées à la même époque dans les différentes provinces.

La prochaine série de lois particulièrement favorables au mouvement syndical fut celle des années 1960, qui autorisèrent et, d'une certaine façon, imposèrent la syndicalisation des employés du secteur public et la négociation de leurs conditions de travail. La mesure, au Québec, date de 1965 ; au fédéral, c'est la Loi sur les relations du travail dans la fonction publique qui l'a introduite en 1967. Au Québec et dans quelques provinces, l'imposition générale de la formule Rand, vers les années 1975, a apporté au mouvement syndical un appui inappréciable.

Depuis 1980, les interventions législatives ont été moins généreuses, comme la suspension du droit de négocier dans les organismes fédéraux et l'imposition d'augmentations maximales de 6 pour cent et de 5 pour cent en 1982 et 1983. La

1 Loi Le Chapelier du 14–17 juin 1791. Combination Acts, 39 Geo. III, c. 81, et 39–40 Geo. III, c. 106. Marie-Louis Beaulieu, *Les conflits de droit dans les rapports collectifs du travail*, Québec, les Presses universitaires Laval, 1955 (541 p.), pp. 73, 515 et 517.

loi sur le contrôle des prix et des salaires, adoptée en 1975, annonçait les restrictions qui allaient se refléter, dans différentes provinces, au cours des années 1980.

Les grandes dates de l'histoire

Les premiers travailleurs à se regrouper étaient des hommes de métiers. On retrouve des traces d'unions de typographes à Québec en 1827, à Toronto en 1832, à Montréal et à Hamilton en 1833. Les ouvriers de la chaussure et des chantiers maritimes s'organisèrent à la même époque[2].

Pendant les cinquante premières années, les syndicats naissants étaient limités à une ville ou à une région, souvent à un lieu de travail. Des liens existaient avec des unions britanniques; celles-ci avaient souvent inspiré la fondation du syndicat. Les membres gardaient contact, rien de plus. Vers 1850, quelques groupes se fondent selon le modèle et à l'inspiration des unions américaines. Les deux types d'unions ont cohabité assez longtemps.

Un premier effort de regroupement canadien vit le jour, en 1873, à Toronto, avec la fondation de l'Union ouvrière canadienne. Comme plusieurs syndicats locaux ou régionaux qu'elle voulait regrouper, l'Union eut la vie courte. La fondation du Congrès des métiers du travail du Canada en 1883 fut plus durable. Le regroupement vit encore sous le nom de Congrès du travail du Canada. Cette fondation n'était que le prolongement, au Canada, de la fondation aux États-Unis, d'abord de façon temporaire en 1881, puis de façon permanente en 1886, de la Fédération américaine du travail.

La grande préoccupation des cinquante années qui suivirent fut d'organiser le mouvement ouvrier et de le faire reconnaître par les employeurs. Le cœur du mouvement demeurait le regroupement des hommes de métiers, particulièrement dans la construction et le vêtement. Cependant, le mouvement commençait à se préoccuper des grandes concentrations d'employés, par exemple, dans les manufactures de textile et dans les mines. Les employés de chemins de fer, regroupés dans différentes fraternités, un peu comme des unions de métiers, formaient des groupes solidement établis depuis les années 1870 et 1880.

L'essor véritable du mouvement ouvrier viendra d'une législation qui offrait aux syndicats une reconnaissance officielle et obligeait les employeurs à négocier avec les représentants ainsi désignés de leurs employés. Il s'agit du Wagner Act aux États-Unis, en 1935, du C.P. 1003 dans les industries de guerre canadiennes, en 1944, et des différentes lois de relations ouvrières adoptées vers la même époque par chaque province canadienne.

Un autre facteur fut la création d'unions de type industriel, suite à la formation d'abord, en 1934, du Committee for Industrial Organization, transformé en Congress of Industrial Organizations en 1938, et dont le correspondant canadien fut établi en 1940, sous le nom de Congrès canadien du

2 Louis-Marie Beaulieu, *Les conflits de droit*, pp. 62–3. H.A. Logan, *Trade Unions in Canada* Toronto, Macmillan, 1948 (639 p.), pp. 23–24. Jean-Pierre Després, *Le mouvement ouvrier canadien*, Montréal, Fides, 1946 (205 p.), pp. 33–34.

travail. Les efforts de recrutement, particulièrement dans les industries de l'acier et de l'automobile, allaient déclencher un mouvement de croissance irrésistible en faveur de ce type d'organisation syndicale. La situation de guerre n'a pas nui non plus : les employeurs, dont les profits étaient souvent déterminés par une marge fixe au-delà des coûts de production, avaient tout intérêt à accorder de meilleures conditions de travail, et ne s'objectaient pas à la syndicalisation de leurs employés.

C'est sur cet élan que le syndicalisme se développa pendant les dix ou quinze années qui suivirent la fin de la seconde guerre mondiale.

Vers la fin des années 1950, le mouvement commença à s'essouffler, d'abord aux États-Unis, puis au Canada. Au Canada, il n'y eut pas de recul, mais une croissance relativement faible de 1955 à 1965. Le second souffle sera le résultat de lois relatives à la syndicalisation du secteur public. C'est au-delà d'un million de membres qui allaient ainsi s'ajouter, de façon presque automatique, au cours des années 1960 à 1980, grâce à la syndicalisation du secteur public[3].

Depuis une dizaine d'années, le mouvement syndical canadien a subi de profondes transformations, même si celles-ci n'ont pas attiré l'attention du grand public. L'importance relative des syndiqués du secteur public en est une. Alors qu'en 1961, les syndiqués du secteur public représentaient à peine 10 pour cent de tous les syndiqués au Canada, ils constituent maintenant 40 pour cent de cet ensemble. Ceci implique que la proportion des syndiqués du secteur privé a diminué de façon importante. Le taux de syndicalisation dans le secteur privé ne dépasse pas 25 pour cent des employés syndicables.

Une autre transformation majeure est la canadianisation du mouvement. Autour de 1960, le nombre de syndiqués appartenant à des unions internationales ou nord-américaines atteignait près de 75 pour cent ; aujourd'hui il est de moins de 40 pour cent. Evidemment, l'arrivée de tous les employés du secteur public a contribué pour une bonne part à cette diminution. Mais il y a eu aussi plusieurs syndicats dont les succursales canadiennes se sont séparées de l'union américaine. Parmi les cas récents, le plus célèbre est évidemment celui des travailleurs de l'automobile. Comme d'autres groupes plus petits songent à s'affilier à de telles unions canadiennes, il est fort possible que le résultat final soit une modification majeure de la carte syndicale, quand l'opération sera terminée, si jamais elle se termine un jour.

Enfin, si le mouvement syndical rêvait d'unité lorsque s'est opérée, en 1956, la fusion des deux groupes principaux à ce moment, soit le Congrès des métiers et du travail du Canada et le Congrès canadien du travail, il n'en est plus question aujourd'hui, alors que, depuis 15 ou 20 ans, les centrales syndicales se sont multipliées et que les groupes non affiliés ont acquis de plus en plus d'importance, atteignant 20 pour cent de tous les effectifs syndicaux. Il ne serait pas exagéré de parler d'une balkanisation du mouvement ouvrier, tant les

3 Joseph B. Rose, « Growth Patterns of Public Sector Unions », in *Conflict or Compromise : The Future of Public Sector Industrial Relations*, ed. Mark Thompson and Gene Swimmer, Montréal, l'Institut de recherches politiques, c. 1984 (466 p.), pp. 82–96.

TABLEAU 2
Nombre de syndiqués au Canada selon quelques affiliations 1911–1985

Années	Nombre total (000)	Taux de syndic. (%)	CMTC (CCT)[1] CTC		S. membres u. intern.		S. membres u. nat.		Membres s. can. non aff.	
			Nombre (000)	%	Nombre (000)	%	Nombre (000)	%	Nombre (000)	%
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1911	133	–	80	60.2	119	89.5				
1921	313	16.0	174	55.5	223	71.2	50	16.0		
1931	311	15.3	141[2]	45.3	216	69.5	49	15.8		
1941[3]	580	18.0	430	74.1	349	60.1	214	37.0	50	10.8
1951	1,029	28.4	783	76.1	726	70.6	310	30.1	55	5.3
1961	1,447	31.6	1,071	74.0	1,040	71.9	354	24.5	126	8.7
1971	2,211	33.6	1,654	74.8	1,371	62.0	784	35.5	243	11.0
1981	3,487	37.4	2,369	67.9	1,558	44.7	1,842	52.8	728	20.9
1985	3.666	39.0	2,120	57.8	1.445	39.4	2,125	58.0	799	21.8

1 Les membres du C.C.T. sont inclus dans les chiffres de 1941 (200,089) et de 1951 (312,532).
2 Le Congrès pancanadien du travail comptait alors 28,322, qu'on pourrait ajouter aux 141,137 du CMTC (% de 54.3).
3 Les chiffres de 1941 sont approximatifs, à cause de variations dans les données.

SOURCES: Canada, Ministère du Travail, *Répertoire des organisations de travailleurs au Canada*, 1911–1985 ; Statistique Canada, *Statistiques historiques du Canada*, deuxième édition, 11-516, tableaux E-175-189.

groupes sont nombreux et tant les animosités et le maraudage entre les différents groupes peuvent être intenses.

Si le nombre des syndiqués du secteur privé diminue, c'est, entre autres raisons, parce que la main-d'œuvre elle-même diminue, du moins dans les secteurs manufacturier et minier. C'est l'effet inévitable, sinon normal, des progrès technologiques. Les pertes d'emploi dans ces secteurs sont remplacées, en quelque sorte, par le développement des services et des emplois qui s'y créent. Mais le syndicalisme ne s'y développe pas à la vitesse à laquelle le secteur lui-même progresse. Les unités, généralement beaucoup plus petites, s'y prêtent moins bien. Du côté syndical, certains semblent avoir oublié les méthodes d'organisation qui ont construit le mouvement, il y a cinquante ans. On compte aujourd'hui beaucoup plus sur des décisions du gouvernement pour assurer la syndicalisation que sur la conviction personnelle qui se transmet de bouche à oreille.

Les nouveaux syndicats qui se sont formés depuis une dizaine d'années l'ont été majoritairement dans le secteur public et dans les services. Ce sont les professionnels de la santé, comme les physiothérapeutes, le inhalothérapeutes, les archivistes médicales et la pléthore d'autres groupes de cette nature qui ont, depuis quelques années, demandé et obtenu principalement leur accréditation. La modification qui s'ensuit dans la composition même du monde syndiqué ne manquera pas d'influencer l'orientation de tout le mouvement.

Nombres et proportions

Les données numériques sur la syndicalisation au Canada sont quasi inexistantes avant le début du XX^{e} siècle. À ce moment, les chiffres les plus optimistes indiquent qu'il y avait peut-être un peu plus de 100,000 membres d'unions ouvrières dans l'ensemble du pays, mais ce nombre ne représente pas 10 pour cent de la main-d'œuvre syndicable. Jusqu'aux années de la dépression, le nombre de membres doublera à peine, tout comme leur proportion parmi les salariés non agricoles qu'ils représentent.

L'essor commence véritablement autour des années 1940. Cette fois, c'est en cinq ans que le nombre de syndiqués a doublé, passant d'environ 300,000 à environ 600,000 en 1942. La proportion double également. À la fin de la guerre, il y a près de 800,000 syndiqués, qui représentent 28 pour cent de la main d'œuvre syndicable.

Le million de membres est atteint en 1949, mais la proportion demeure alors à 29.5 pour cent. Les 2 millions seront atteints à la fin des années 1960, avec un taux de 33 pour cent. Les 3 millions, vers la fin des années 1970, avec un taux de près de 40 pour cent. Le nombre continuera d'augmenter légèrement, mais la proportion demeure encore la même.

En fait, c'est la syndicalisation du secteur public qui a « permis » le progrès des vingt-cinq dernières années. Dans le secteur privé, la stagnation ou le recul date du début des années 1960. (Voir le tableau 2.)

Pendant les premières décennies du XX^e siècle, le C.M.T.C. a regroupé de 50 pour cent à 60 pour cent de tous les syndiqués canadiens : il y eut à cette période différentes centrales rivales, mais de moindre importance. Après la fusion du C.M.T.C. et du C.C.T., le C.T.C. a maintenu pendant 15 ans une représentativité d'environ 75 pour cent. Depuis les années 1970, avec le départ de groupes importants, le C.T.C. ne représente plus aujourd'hui qu'un peu plus de la moitié de tous les effectifs syndicaux.

La proportion des membres d'unions internationales a constamment diminué au Canada. De 90 pour cent qu'elle était au début du siècle, elle est demeurée stable autour de 70 pour cent de 1931 à 1961. Elle atteint les 50 pour cent vers 1975 et représente aujourd'hui moins de 40 pour cent des effectifs syndicaux canadiens.

Les groupes non affiliés sont demeurés quantité négligeable jusqu'à la fin des années 1960 où ils ont atteint 10 pour cent du nombre de tous les syndiqués. Leur proportion dépasse aujourd'hui 20 pour cent.

Le syndicalisme canadien est devenu une véritable industrie. Il a quelque 30,000 salariés à son emploi et un budget annuel global d'environ un milliard de dollars[4].

Mode de recrutement et vie interne

Au cours du XIX^e siècle, la vie du mouvement syndical était concentrée dans les cellules de base. Les premiers objectifs qui ont rallié les syndiqués d'alors étaient des causes communes, comme la campagne en faveur de la journée de neuf heures de travail ; celle-ci battait son plein autour des années 1870, pendant les développements importants qu'on connaissait alors, à Québec, Montréal, Toronto et Hamilton.

Bien avant que la loi rende obligatoire la signature de cartes d'adhésion, pour établir le caractère représentatif de l'association ouvrière, les divers groupes faisaient déjà signer des cartes d'adhésion à leurs futurs membres. C'était le moyen de s'assurer du sérieux et de la volonté des travailleurs en cause dans leur engagement envers le syndicat. C'est pour assurer la permanence de cet engagement que plusieurs unions ou fraternités établirent divers régimes d'assurance rattachés à la cotisation syndicale.

Très tôt dans les négociations de conventions collectives, les syndicats réclamèrent des employeurs l'engagement de n'embaucher que des syndiqués ou d'obliger les nouveaux employés à devenir membres du syndicat : à une période où l'accréditation n'existait pas encore, c'était une condition indispensable de survie, là où on avait réussi à faire signer suffisamment de cartes pour convaincre l'employeur de négocier avec les représentants syndicaux.

Avec le régime d'accréditation et de représentation exclusive, pendant la

4 Statistique Canada, *Emploi, gains et durée du travail*, 72–002, janvier 1987, p. 11, et *Rapport annuel du ministre des Approvisionnements et Services Canada présenté sous l'empire de la Loi sur les déclarations des corporations et syndicats ouvriers*, Partie II : syndicats ouvriers, 71–202, 1983, p. 83.

durée de chaque convention collective, le problème de la survie d'un syndicat devenait moins préoccupant. L'objectif de la clause de sécurité syndicale a quelque peu changé ; là où elle existe, elle assure maintenant au syndicat en place une représentation majoritaire et même exclusive, sauf dans les derniers mois de la convention où le maraudage est permis. Pourvu que le syndicat obtienne pour les salariés des conditions de travail raisonnables et qu'il leur fournisse des services convenables, le syndicat en cause est pratiquement assuré de sa survie avec une bonne clause de sécurité syndicale.

Il s'est dès lors préoccupé davantage de négociations, et il a cherché, entre autres choses, à élargir le cadre des négociations. Il a dû, en conséquence, établir des mécanismes de délégation pour maintenir le principe démocratique de la prise de décision par l'assemblée syndicale. Chaque unité de base perdait ainsi de son influence et le pouvoir des technocrates et des permanents syndicaux augmentait en proportion. La vie syndicale ressemblait de moins en moins à celle d'un mouvement, de plus en plus à celle d'une institution.

C'est dans le secteur public que le double phénomène de la délégation nécessaire et de l'éloignement de la base a pris des proportions tragiques. Cet écartèlement entre la base et la direction a amené un désintéressement quasi total d'abord de la négociation, même de la représentation syndicale dans certains cas. Il serait faux de dire que les travailleurs ne sont plus intéressés au travail qu'ils accomplissent ; mais ils ont perdu tout intérêt dans les niveaux de représentation que les circonstances et les gouvernements ont établis au-dessus de leurs têtes.

Objectifs et idéologies

L'évolution des objectifs et des idéologies du mouvement syndical est moins uniforme et rectiligne que celle de sa vie interne. Les grandes idées qui animent un mouvement, sinon une institution, ont bien des facettes et se révèlent de bien des façons. Aussi, faut-il bien distinguer le discours et la pratique, tel groupe à tel moment et tel autre dans d'autres circonstances. Toutes les variantes coexistent, pas toujours paisiblement, mais sans entraîner non plus des ruptures qui auraient pu sembler inévitables.

En un sens, le mouvement syndical a toujours voulu améliorer les conditions de travail, mais pas toujours pour les mêmes raisons, surtout pas par les mêmes moyens. Déjà, au XIX^e^ siècle, certains poursuivaient le renversement de l'ordre social, alors que d'autres voulaient améliorer la situation, soit par la création d'institutions nouvelles, dites socialistes, soit par la simple correction des abus qu'on rencontrait hélas trop fréquemment alors. Il faut bien noter, cependant, que ceux qui ont constitué le mouvement syndical au XIX^e^ siècle, et qui en ont profité, ont été principalement des hommes de métiers, pas des manœuvres, ni des femmes ni des enfants, si ce n'est de façon indirecte.

Au tournant du XX^e^ siècle, ce qu'on appellera bientôt le syndicalisme d'affaires était déjà bien établi. La création de la Fédération américaine du travail et l'influence de son président-fondateur y auront grandement contribué.

À côté du C.M.T.C., on trouve, au Canada, des groupes rattachés aux Chevaliers du travail, à la Fédération canadienne du travail, et, après la première grande guerre, à la One Big Union, de tendance radicale. Aucun de ces groupes n'aura d'influence vraiment considérable, même pas le Congrès pancanadien du travail qui tentera, en 1927, d'en regrouper plusieurs. Le syndicalisme d'affaires est demeuré le modèle dominant.

L'idéologie marxiste a toujours exercé un attrait chez certains représentants syndicaux. On la retrouve au siècle dernier, au cours de la deuxième guerre mondiale et dans les années qui ont suivi. Même si les conflits entre unions communistes et non communistes n'ont jamais eu au Canada l'acuité qu'ils ont pu atteindre aux États-Unis, le courant a toujours existé, même au Québec et jusqu'à tout récemment. Autour de 1970, nous avons vu certains chefs syndicaux se réclamer de la philosophie maoïste. Mais la masse des syndiqués ne s'est jamais laissée embarquer dans ces mouvements radicaux, révélant ainsi une autre caractéristique d'une institution, dont les bureaucrates sont partiellement décrochés de la base.

Les efforts du mouvement ont été beaucoup plus importants du côté politique. Le mouvement syndical canadien a appuyé un ou des partis politiques ; il s'est affilié au Nouveau parti démocratique ; il a discuté de la création d'un parti ouvrier, mais sans beaucoup plus de succès que sur le plan idéologique.

Un symbole de cet échec relatif s'est concrétisé à l'occasion de l'élection fédérale de 1962. Jean Marchand, alors président de la C.S.N., avait mis tout son poids, son prestige et son intelligence à démontrer le caractère fallacieux des principes de base du Crédit social. Il avait fait campagne à travers tout le Québec en ce sens ; il s'était affronté au chef créditiste devant les caméras de la télévision. Son argumentation paraissait inattaquable. Pourtant, les électeurs québécois ont envoyé, le jour de cette élection, 26 députés créditistes à la Chambre des communes. Plus curieux encore, ce n'étaient pas les cultivateurs, mais les ouvriers des petites villes de province, où la C.S.N. était particulièrement présente, qui avaient voté massivement en faveur du Crédit social.

Plus récemment, au Québec, les représentants syndicaux ont donné leur appui au Parti Québécois, ce qui n'a pas empêché les électeurs québécois de voter non au référendum et de rejeter le Parti Québécois après deux termes au pouvoir. Pas plus en politique qu'au plan idéologique, le mouvement syndical canadien n'a vraiment trouvé sa voie. La multiplicité des centrales et les voix discordantes qu'elles font entendre sur les problèmes politiques, économiques et sociaux en sont la preuve convaincante.

B. ANALYSE

Au terme de cette esquisse historique, il n'est peut-être pas sans intérêt de soulever diverses questions concernant les objectifs du sydicalisme, ses méthodes d'action et son statut dans notre société.

Objectifs du syndicalisme

S'il est un objectif que le syndicalisme s'était proposé et a, du moins partiellement, réalisé, c'est bien celui de l'amélioration des conditions de travail. Sans doute, les développements de la conscience sociale et l'accroissement de la productivité des entreprises sont des facteurs tout aussi importants que le syndicalisme. Il reste que le mouvement syndical y a contribué, par ses campagnes pour la journée de neuf heures, puis pour la journée de huit heures, ensuite pour le salaire minimum, l'assurance-chômage et les autres formes de bien-être que notre société assure aujourd'hui à une grande partie de ses membres.

Sous un autre aspect, on ne peut s'empêcher d'observer que le mouvement syndical a toujours défendu, dans son action directe, surtout par le moyen de la négociation collective, les mieux nantis des travailleurs : les hommes de métiers au XIX^e^ siècle, les ouvriers des entreprises de production de masse, depuis les années 1930, les employés du secteur public plus récemment et même, aujourd'hui, bon nombre de professionnels. Sans doute, les représentants syndicaux répétaient-ils, à intervalles relativement fréquents, la nécessité d'augmenter le salaire minimum et d'améliorer les prestations du bien-être social ; mais, dans l'action syndicale concrète de tous les jours, ils travaillent pour leurs membres, bien plus que pour les laissés-pour-compte de notre société.

En somme, malgré toutes ses déclarations, l'institution syndicale appartient bien à l'économie capitaliste : ce qui est bon pour ses membres est bon pour toute la société où ils vivent, et bien impertinent serait celui qui oserait mettre en doute la vérité de ce principe. Il n'est pas sûr, cependant, que les employés des industries de misère, car il y en a encore, soient bien d'accord là-dessus. C'est un peu le même phénomène qui explique l'animosité qui commence à se manifester entre syndiqués du secteur public et syndiqués du secteur privé.

Un des principes que le syndicalisme a toujours défendu avec acharnement—et sans doute à bon droit—c'est le droit de libre association. Mais il y a lieu de se demander si l'application syndicale du droit de libre association est conforme à l'idée de base que le citoyen ordinaire peut s'en faire. Le premier article substantiel du Code du travail du Québec, comme de la plupart des lois de relations ouvrières canadiennes, affirme que « tout salarié a le droit d'appartenir à une association de salariés de son choix. » À l'heure actuelle, pratiquement aucun salarié ne peut exercer ce droit, si ce n'est quand un nouveau syndicat se fonde quelque part, et dans les cas très rares où il y a changement d'allégeance. En dehors de ces cas exceptionnels, le salarié n'a pas le choix : il ne peut adhérer à aucune autre association qu'à celle qui est déjà en place et, dans bien des cas, il est strictement obligé de devenir membre de cette association, en tout cas d'en payer la cotisation.

Il serait intéressant de voir comment les tribunaux réagiraient à la question de savoir si l'obligation d'appartenir au syndicat en place, et l'obligation de lui payer une redevance, bon gré mal gré, sont compatibles avec le droit de libre

association, tel qu'il est énoncé dans toutes les chartes. C'est peut-être un cas de conflit entre le droit des personnes et le droit des collectivités. Mais le principe du droit de libre association n'a plus beaucoup de sens dans tous les milieux où le syndicalisme est déjà implanté, c'est-à-dire partout dans le secteur public et dans les grandes entreprises, souvent dans les moyennes entreprises.

L'obligation pour l'employeur de déduire la cotisation syndicale ou son équivalent de la paie de tous les salariés dans l'unité accréditée est tout simplement une application particulière du principe général, admis dans la société canadienne, qu'on est obligé d'appartenir au syndicat installé où l'on se trouve un emploi. Certaines législations en ont fait même une disposition de la loi, sans qu'il soit besoin d'en négocier le principe. Une telle situation fait du syndicalisme beaucoup plus une institution qu'un mouvement.

Méthodes

Le mouvement syndical nord-américain a fait de l'affrontement un des ses principes de base. Même s'il a rejeté majoritairement le principe de la lutte des classes, il conçoit la société économique comme constituée de deux groupes de personnes, les dirigeants et les dirigés, et l'opposition entre les deux est endémique. Même les théoriciens du mouvement ont fait de cet élément d'opposition le fondement même des relations du travail (« adversary system »).

Cela n'a pas empêché plusieurs expériences de collaboration patronale-ouvrière de se poursuivre et de réussir. La situation économique difficile du début des années 1980 a multiplié les expériences de cette nature. Plutôt que de disparaître complètement, bien des syndicats ont compris qu'il valait mieux travailler avec la direction à la survie de l'entreprise. Plusieurs croient que les leçons apprises à cette occasion continueront d'influencer les relations du travail pour bien des années. D'autres pensent au contraire que l'attitude de confrontation reviendra dès que la situation économique se sera suffisamment améliorée. C'est d'ailleurs ce que nous avons commencé à revivre, du moins dans le secteur public.

Vers 1975, plusieurs provinces ont introduit diverses dispositions qui visent à assurer la vie démocratique à l'intérieur des syndicats. La plupart des lois de relations du travail obligent aujourd'hui les différents syndicats à tenir un vote de ratification, suite à une entente de principe avec l'employeur : ce vote d'acceptation ou de rejet des dernières offres patronales, ainsi que le vote de grève en cas de conflit, sont censés assurer le caractère démocratique de deux des décisions les plus importantes dans la vie syndicale. Mais l'obligation qu'impose la loi de tenir ces votes ne règle pas tous les problèmes. La décision de tenir ce vote et le moment de le faire sont à l'entière discrétion du syndicat, généralement du permanent, de l'agent d'affaires ou des dirigeants. On a vu des cas où des votes de ratification ont été reportés fort longtemps et des cas où des groupes de salariés ont eu du mal à obtenir qu'un vote soit tenu.

Peut-être à cause des avantages qu'il a obtenus au cours du temps, le mouvement syndical est devenu un des groupes les plus conservateurs, sinon le plus conservateur de toute notre société. Tout projet qui implique une modification, si minime soit-elle, de son statut actuel, soulève des protestations telles de sa part qu'aucun gouvernement ne s'est encore engagé dans cette direction, si ce n'est à l'occasion d'événements tragiques, où il se sentait fort de l'appui de la quasi-totalité de la population. La question du statut du syndicalisme est donc fondamentale.

Statut

Pour appuyer les différentes démarches des associations ouvrières dans leurs objectifs de justice sociale, la plupart des gouvernements leur ont accordé des privilèges et des avantages, qui ont assuré leur croissance et leur survie. On peut prendre pour acquis que le contexte dans lequel ils ont été accordés le justifiait. Une fois le mouvement devenu institution, on peut s'interroger sur l'opportunité de maintenir de tels privilèges.

La principale immunité dont jouit le mouvement syndical est celle de ne pouvoir être accusé de coalition pour nuire à la liberté du commerce ou à la libre concurrence. Dans l'esprit des législateurs, la concurrence dont il était question à ce moment ne dépassait pas les frontières du pays en cause ; aujourd'hui la concurrence est mondiale. Personne ne peut ne pas constater les problèmes que soulève la négociation collective dans les secteurs de concurrence internationale.

Il y a une immunité qui n'est pas dans les lois mais qui existe de fait et qui soulève des interrogations. La pratique veut qu'à la suite d'un conflit de travail, un protocole de retour au travail contienne l'absolution pour tout ce qui a été fait durant le conflit et le retrait de toutes les poursuites qui ont pu être intentées à cette occasion. La généralisation d'une telle condition, endossée même par des gouvernements en plus d'une occasion, a pour effet qu'en cas de conflits de travail, tous les participants acquièrent l'immunité de fait pour tous genres d'action, contre la propriété, et même dans certains cas, contre des personnes. Bien des entreprises profitent de certaines immunités, par exemple au plan fiscal, mais la violation d'un droit ne fait pas un acte de vertu de la violation d'un autre droit tout aussi important.

L'autre privilège accordé tant aux travailleurs qu'à l'institution syndicale, c'est le renversement du fardeau de la preuve en de multiples occasions, qu'il s'agisse de sanctions imposées à l'occasion ou à la suite d'activités syndicales, d'accidents du travail ou de recours concernant une norme du travail imposée par la loi. On comprend très bien pourquoi le législateur a créé une telle présomption en faveur du salarié, mais il faudrait être aveugle pour ne pas se rendre compte des difficultés qu'elle provoque et des avantages qu'elle accorde à l'institution syndicale.

Un autre privilège accordé cette fois uniquement à l'institution syndicale

c'est le fait que la loi déclare que les seuls syndicats impliqués—avec l'employeur depuis quelques années—sont parties intéressées en matière d'accréditation et d'unité d'accréditation, pour ne donner que cet exemple. Le sort de nombreux employés peut ainsi être décidé sans qu'ils soient même consultés. Qu'il suffise de rappeler, à ce sujet, que 200 annonceurs-pigistes de Radio-Canada avaient signé des cartes d'adhésion à l'Union des artistes, en 1979, pour que celle-ci les représente auprès de leur employeur. Le Conseil canadien des relations du travail a étudié le cas pendant plus de trois ans. Il a finalement relocalisé les 200 annonceurs dans d'autres unités de négociation sans avoir consulté un seul d'entre eux.

D'autres mesures protègent l'institution autant, sinon plus, que les travailleurs. Mentionnons, à titre d'exemple, la disposition anti-briseurs de grève du Code du travail du Québec, et la pérennité de l'accréditation non seulement dans les cas de vente d'entreprise mais même dans ceux de concession partielle, comme à l'occasion de sous-contrats. Cette disposition se trouve, sous une forme ou sous une autre, dans toutes les lois de relations ouvrières canadiennes.

Organismes privés ou publics ?

Finalement, un syndicat ouvrier est-il, en 1987, un organisme privé, public ou semi-public ? La question n'est pas que théorique, elle a de multiples implications pratiques.

Si le syndicat est un organisme privé, il doit avoir la liberté de se développer comme il l'entend, mais il ne peut en même temps jouir de privilèges que d'autres groupements ne possèdent pas. Si c'est un organisme public, les privilèges qu'on lui a accordés peuvent être justifiés, mais ceux-ci lui imposeront en contrepartie de multiples obligations envers la société, une surveillance plus étroite de chacune de ses activités et surtout des limites impérieuses aux divers types d'activités qu'il pourrait exercer. Pour ne donner qu'un exemple : un organisme public ou quasi public ne peut s'adonner, directement ou indirectement, à des activités politiques, ni soutenir un parti ou un mouvement politique quel qu'il soit, pas plus qu'il ne doit véhiculer une idéologie particulière. On ne peut en même temps jouer sur tous les plans et gagner sur tous.

Il faut s'assurer que le mouvement syndical obtienne justice, une justice qui corresponde à son statut actuel—non pas à ses activités passées—la même que celle que doit avoir tout organisme de même catégorie, ni plus, ni moins. Bien davantage, il faut s'assurer que tous les travailleurs et tous les citoyens obtiennent justice dans le respect intégral de leurs droits fondamentaux.

ERNEST CAPARROS, S.R.C.*

Évolutions et involutions en droit privé†

IL FAUT SAVOIR GRÉ au président de notre Académie d'avoir organisé ce colloque sur le changement des institutions. Je tiens en outre à le remercier de m'avoir invité à vous adresser la parole à cette occasion. Il m'a semblé, cependant, que je n'avais pas le droit de vous infliger un texte aride, par trop juridique, et qu'il était préférable de m'en tenir à quelques réflexions d'ordre général. Elles seront, néanmoins, celles d'un juriste et porteront sur des institutions juridiques vues sous l'angle de l'évolution et de l'involution.

Je dois vous l'avouer d'entrée de jeu, je me sens parfois mal à l'aise face à des interventions des législateurs, notamment lorsqu'on peut dévouvrir dans un même texte un élément d'évolution et un autre d'involution. Ce malaise ne fait qu'empirer lorsque je vois le législateur inciter à l'évolution, d'une part et déclencher un processus d'involution, d'autre part. Tant et si bien que l'on doit se demander où est passée la logique. Les législateurs recherchent-ils le but ultime de toute intervention législative, le bien commun ?

Je me limiterai à illustrer ce malaise à l'aide d'exemples tirés de la famille et de ses décalques sociologiques. Pour éviter que ma réflexion n'empiète sur la communication de notre collègue Evelyne Lapierre sur la famille canadienne au XX^e^ siècle, je m'en tiendrai à noter les évolutions et les involutions que j'ai décelées dans les textes législatifs concernant, d'un côté, le mariage, sa rupture et ses décalques et, de l'autre, les enfants.

LE MARIAGE, SA RUPTURE ET SES DÉCALQUES

Notre attention se portera ici vers deux aspects contradictoires des interventions

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des législateurs : la tension que celles-ci créent entre le mariage et le divorce constituera le premier volet de notre réflexion ; le second nous permettra de constater les résultats contradictoires auxquels il est possible d'arriver lorsqu'on accorde la faveur législative tantôt au mariage, tantôt aux unions de fait. Mais il convient, tout d'abord, de faire quelques précisions terminologiques.

Précisions terminologiques

Première précision. Il n'est pas rare de rencontrer, même dans des écrits juridiques, des expressions comme « mariage légal » ou « mariage juridique » que l'on oppose à l'expression « mariage de fait ». C'est à y perdre son latin . . . et son français en plus ! Le mariage, par définition, comporte un élément juridique : il s'agit d'un échange public des consentements devant une autorité constituée ; en conséquence, le qualificatif « légal » ou « juridique » est redondant. Certes, il y a des réalités sociologiques qui ressemblent au mariage. Ce sont ses décalques, ses imitations. Mais en droit, ce ne sont pas des mariages. Ainsi l'expression « mariage légal » est redondante. Et l'expression « mariage de fait » est contradictoire.

Deuxième précision. L'expression « union de fait »—au singulier—repose sur une erreur conceptuelle. En effet, les personnes que vise cette expression n'ont pas un cadre de référence commun, hormis, certes, le fait qu'elles ne se sont pas mariées entre elles. La notion de mariage, en revanche, présuppose un cadre de référence juridique commun à toutes les personnes mariées. Bien sûr, la façon dont chaque individu vit son mariage ou vit en union de fait diffère de l'un à l'autre. Mais mon propos porte sur le cadre de référence juridique, sur les droits et devoirs des époux intégrés dans un Code civil ou dans une législation spécifique au mariage. Par conséquent, l'absence d'un tel cadre juridique ne permet pas de parler de l'union de fait, comme on parle du mariage, mais des unions de fait[1]. Bref, l'expression « union de fait », lorsqu'elle est employée au singulier, et parallèlement à l'expression « le mariage », présuppose qu'il s'agirait d'une institution. Or elle n'est pas institution juridique. Elle n'est que réalité sociologique. De ces deux réalités—union de fait et mariage—seul le mariage est une institution juridique.

Ma dernière précision terminologique concerne l'expression « union libre ». Il s'agit d'une expression avec une lourde charge idéologique et véhiculant, par ricochet, une idée fausse du mariage. En effet, la célébration du mariage, pour être valide, exige des conjoints qu'ils échangent librement et consciemment leur consentement, et les vices du consentement (erreur, dol, violence ou crainte) s'appliquent aussi au mariage. Le temps des mariages « forcés » est révolu, même si dans certaines sociétés qui n'ont pas reçu l'influence bénéfique du Droit canonique, il peut encore arriver que les mariages soient davantage des arrangements de famille, qu'un échange de consentements libres et responsables de la part des époux.

1 Voir *Les concubinages*, Jacqueline Rubellin-Devichi (dir.), Paris, les Presses du CNRS, 1986.

Ainsi, opposer « union libre » et mariage, c'est méconnaître la réalité juridique du mariage. Charge idéologique, disais-je, peut-être oubliée, mais non moins certaine, car c'est bien au nom d'une idéologie qui rejette les normes juridiques, le Droit, que les anarchistes ont été les premiers à préconiser ce que l'on appelle « union libre ». Ne sommes-nous pas, par ailleurs, confrontés à une contradiction dans les termes ? Que peut bien signifier une union qui est libre de tout lien ? Et assumer un lien librement, est-ce que cela ne comporte pas l'exercice de notre liberté ?

Il est vrai, néanmoins, que dans son utilisation courante, même dans certains textes juridiques, l'expression « union libre » se veut aseptique. On y a recours pour éviter le terme « concubinage » qu'on prétend chargé de contenu moral, bien que, en soi, ce terme soit aseptique. Le contenu moral se trouve davantage dans la réalité que dans le mot qui la recouvre. Tandis qu'il y a un contenu idéologique qui est au principe même de l'expression « union libre ».

La tension entre le mariage et le divorce

La tension entre le mariage et le divorce se situe fondamentalement dans la conception que l'on se fait du mariage. Si le mariage est conçu comme la pierre d'angle de la famille et celle-ci comme la cellule de base de la société, alors pour lui permettre de jouer ce rôle on s'attachera à sa stabilité, voire à son indissolubilité. Par ailleurs, confrontés aux mariages qui ne réussissent pas, les législateurs ont voulu faire place au divorce. Ignorant la sentence : « Ce que Dieu a uni, que l'homme ne le sépare pas » (Mt, 19,6), ils reviennent sur la notion d'indissolubilité et concluent qu'il y a des cas où, le mariage ne fonctionnant plus, il vaut mieux délier les conjoints et leur permettre de « refaire leur vie ».

Curieusement, cependant, les études sur le divorce se font toujours sous l'angle du mariage, de la famille ; le divorce est présenté même comme une façon de consolider la famille, comme un mal nécessaire, comme un moyen de corriger des erreurs.

Le malaise, dont je parlais tout à l'heure, plane comme un nuage sur ces études. Illustrons-le par des exemples.

Lorsqu'en 1975 la Commission de réforme du droit du Canada publia son document de travail sur le divorce, ce malaise se manifesta de plusieurs façons. Dès l'avant-propos, les commissaires affirment : « Nous croyons que le mariage est la plus importante institution de notre société »[2]. Ils ajoutent, en introduction : « La grande majorité des adultes canadiens se marient et ont l'intention que leur mariage dure toute leur vie. Malheureusement, leurs désirs et leurs espérances d'une union durable sont parfois déçus, car beaucoup de mariages subissent des échecs »[3].

Et d'ajouter : « Le divorce peut cependant fournir une réponse valable aux conflits matrimoniaux. Il ne faut surtout pas assimiler le divorce à une notion

2 C.R.D.C., *Le divorce*, document de travail 13, Ottawa, Information Canada, 1975, p. 1.
3 *Id.*, p. 3.

préjudiciable à l'institution du mariage, car beaucoup de divorcés réussissent leur deuxième mariage »[4]. Et plus loin : « La société *doit* voir le divorce comme étant la conséquence et non la cause de la rupture du mariage »[5]. Ainsi donc, selon cette dernière affirmation, le problème de la poule et de l'œuf se transforme en un postulat ; la Commission de réforme du droit édicte que le divorce n'est pas la cause, mais bien la conséquence, de la rupture du mariage et elle insiste pour que la société le voit ainsi. Quelques lignes plus haut, la Commission avait aussi posé un postulat du même genre : « *La croyance populaire* voulant que les lois libérales en matière de divorce soient la cause de l'irresponsabilité matrimoniale et de la dissolution du mariage *doit être contestée* »[6].

Certes, lorsqu'on veut rejeter ou contester une idée, il faut le faire avec une argumentation serrée. Mais lorsque l'on est à court d'arguments, on peut toujours se replier sur une affirmation plus ou moins démagogique et prétendre que cette idée « est une croyance populaire », donc point scientifique, et que, par voie de conséquence, on peut la rejeter du revers de la main.

Pourtant, des études scientifiques établissent que la plus petite fissure dans une loi touchant la stabilité du mariage se transforme, en peu de temps, en une brèche qui ébranle le mariage. Ces études démontrent aussi que les législations libérales sur le divorce conduisent à une augmentation effarante du nombre de divorces[7].

La même Commission de réforme du droit publiait en 1977 un *Rapport sur le Droit de la famille*[8]. Curieusement, ce Rapport ne porte que sur les questions concernant la rupture du mariage. Les Commissaires affirment : « Le système juridique devrait prévoir les moyens de préserver les familles aussi bien que de dissoudre les mariages »[9]. Mais on dit peu de choses sur la préservation des familles. D'ailleurs, une telle affirmation n'est-elle pas contradictoire ? Est-il vraiment possible de prévoir des moyens pour à la fois préserver les familles et rompre les mariages ?

Dans le but d'établir ce système juridique, la Commission propose de retenir comme seul fondement de la dissolution du mariage l'échec de la relation personnelle entre les conjoints[10]. Elle recommande, en outre, que le témoignage d'un seul conjoint constitue une preuve concluante de l'échec du mariage[11].

Avant de formuler et afin d'évaluer ces recommandations, les Commissaires proposent de ne retenir que « un seul critère que personne ne peut contester : la nécessité de fonder le droit canadien sur une politique rationnelle, humaine et socialement valide de la famille »[12]. Ce critère, dans sa généralité, est

4 *Id.*, p. 5.
5 *Ibidem*, c'est nous qui soulignons.
6 *Id.*, pp. 4–5, c'est nous qui soulignons.
7 Voir W. Binchy, *Is Divorce the Answer* ? Dublin, Irish Academic Press, 1984.
8 C.R.D.C., *Rapport : Droit de la famille*, Ottawa, Approvisionnements et services, 1977.
9 *Id.*, no. 2.9., pp. 16–17.
10 *Id.*, recommandation 1, p. 30.
11 *Id.*, recommandation 3, p. 30.
12 *Id.*, p. 29.

incontestable, mais peut-on affirmer que la répudiation unilatérale par l'un ou l'autre des conjoints soit une règle rationnelle, humaine et valide pour la famille ?

Il me semble que la Commission de réforme, dont le rapport est intitulé *Droit de la famille*, mais qui aurait dû s'intituler plutôt *Droit au divorce*, s'en est tenue à une approche purement chirurgicale de la famille. Si on avait voulu établir une politique rationnelle, humaine et socialement valide de la famille, il aurait fallu s'interroger sur les causes des divorces, les individualiser, les cerner et chercher les mesures de prévention, avant d'appliquer le bistouri ! Mais ce n'est pas ainsi que la Commission procède. Elle constate l'existence des divorces et, de là, cherche à établir la façon, la plus efficace et la moins douloureuse de les accorder. Voilà un autre exemple de cette tension entre le mariage et le divorce où, au nom d'une prétendue évolution, on s'engage dans une involution. Car, en réalité, on ne s'attaque pas au véritable problème.

Laissons les chercheurs et passons aux politiciens. Le 19 janvier 1984, l'honorable Mark MacGuigan, alors ministre de la Justice, annonce un ensemble de modifications à la Loi sur le divorce. La tension mariage-divorce apparaît tout au long de sa brève déclaration d'une page. « Cette réforme de la loi sur le divorce—affirme-t-il dès le début—a pour but d'humaniser le divorce tant à l'égard des conjoints qu'à l'égard de leurs enfants, tout en mettant tout en œuvre pour sauvegarder l'institution du mariage et favoriser le maintien des liens conjugaux »[13]. « *Pour atteindre ce double but* », la loi propose de minimiser l'aspect contentieux de la procédure et de ne retenir comme cause de divorce que « l'échec du mariage, échec qui sera établi par une période de séparation ou d'attente d'un an »[14]. Le rejet de la notion de faute se justifie parce qu'elle n'aurait pas permis d'humaniser le divorce. Par ailleurs, le divorce par consentement mutuel est aussi écarté, car « il aurait, à notre avis, compromis la stabilité de la famille. Par souci de réalisme et de mesure—conclut la déclaration—nous avons choisi d'humaniser le régime du divorce sans pour autant nier le rôle fondamental qu'occupe la famille dans notre société »[15].

Mais où se trouve donc la famille ? Qu'a-t-on fait pour la sauvegarder ? Peut-on avec un minimum de rigueur intellectuelle affirmer que l'on sauvegarde l'institution du mariage et que l'on favorise le maintien des liens conjugaux, alors qu'on permet le bris unilatéral de ces liens ? Il est permis de se demander si la réforme proposée par le ministre MacGuigan, laquelle est morte au feuilleton, constituait une évolution ou une involution. Une chose m'apparaît évidente : chaque fois qu'on facilite le divorce, on le fait en prétendant vouloir protéger la famille. L'hypocrisie serait-elle donc devenue vertu, en remplacement de la sincérité ? Serions-nous devenus des dupes ?

Le gouvernement suivant reprend l'essentiel des réformes proposées en 1984

13 *Pro manuscripto*.
14 *Ibidem*.
15 *Ibidem*.

et fait adopter la nouvelle Loi sur le divorce en 1985[16]. Le débat en deuxième lecture renferme quelques « perles » qui mettent en relief la tension mariage-divorce et qui nous obligent à nous demander où est passée la logique.

Permettez-moi de vous citer quelques passages du débat dans la langue originale qui est l'anglais. Le ministre de la Justice d'alors, John C. Crosbie, constate d'abord un fait : « It is a fact that marriage breakdown occurs in our society. It is an unfortunate fact, but it is a fact. Therefore, legislation is required to settle the issues that arise once a marriage has broken down »[17]. L'effondrement des mariages, qualifié de *unfortunate fact*, exige, selon le ministre, une législation permettant de réparer les pots cassés. Curieusement, on ne se demande pas pourquoi existe cet *unfortunate fact*, ni si on peut le contrer. Puisque le fait existe, réglons-en, non pas les causes, mais les conséquences. Pourtant, dans un autre domaine, celui de la conduite en état d'ébriété, le même gouvernement était intervenu par voie sanctions sévères[18], pensant qu'il pourrait ainsi influer sur les causes plutôt que sur les conséquences. L'analogie est possible, bien que les mesures à prendre appartiennent évidemment à des ordres fort différents. Les vies innocentes qui sont fauchées par des divorces ne sont pas moins nombreuses que celles qui le sont par l'ivresse au volant. Pourquoi ne cherche-t-on pas à intervenir par des mesures appropriées au niveau des causes ?

« Canada's rising divorce rate and the declining marriage rate have led some people to declare that the institution of marriage is in decline. Some believe that what they call a shorter divorce will only contribute to a further weakening of the family. *In my opinion* [pense le Ministre], that is not so. If I thought that were so, I would not be introducing the Bill »[19]. Mais sommes-nous devant des questions d'opinion ou plutôt devant des questions qui peuvent être étudiées scientifiquement ? Des corrélations ont été établies scientifiquement entre l'entrée en vigueur de la loi sur le divorce en 1968 et l'augmentation du nombre des divorces au Canada. Il y a aussi des études qui concluent que plus le divorce est facile à obtenir, plus le recours au divorce augmente[20]. À cet égard, il ne faut pas oublier que la généralisation du divorce mine la stabilité du mariage, de la même façon que la prolifération des voitures pollue l'air que nous respirons.

Sur des questions aussi fondamentales qui mettent en jeu notre projet de société, ce n'est pas l'opinion de quelqu'un—soit-il ministre de la justice—qui compte.

Bien sûr, le Ministre affirme aussi que « the law should promote the philosophy that divorce laws are not for happy people »[21], et souligne que « any law which concerns itself with divorce also has to concern itself with the

16 *Loi de 1985 sur le divorce*, S.C. 1986, c. 4.
17 *House of Commons Debates*, 1st Sess., 33rd Parl., Vol. IV, 1985, 21 May, 1985, p. 4932.
18 *Cf.* Modifications au *Code criminal du Canada*, S.C. 1985, c. 19.
19 *Supra*, note 17, c'est nous qui soulignons.
20 Voir W. Binchy, *supra*, note 7 et ses références.
21 *Common Debates*, *supra*, note 17, p. 4933.

preservation of marriage whenever it is possible. We naturally want marriage to be preserved, and we believe in the preservation of marriages whenever possible »[22]. Il mentionne alors les obligations imposées aux avocats de tenter la reconciliation. Mais comme société sommes-nous en train de prendre les moyens nécessaires pour protéger et conserver les mariages ? Certes il y a l'obligation faite aux avocats de diriger leurs clients vers des services de réconciliation, mais ces recours ne sont-ils pas tardifs ? Lorsqu'une maladie affecte la population, on prend des moyens extraordinaires pour découvrir la cause de la maladie et pour trouver les moyens de la guérir. La législation sur le divorce ne l'a jamais fait !

La logique n'est pas plus à l'honneur chez les autres politiciens qui sont intervenus dans ce débat. Du porte-parole du Parti Libéral Bob Kaplan, retenons une phrase : « I cannot accept the argument of those who want tough divorce as a way of showing the sanctity of marriage or as a way of showing that spouses should work to make their marriage work »[23]. Il est possible que son opinion ait un quelconque fondement, mais telle qu'elle fut exprimée, il ne s'agit que d'une opinion. Par ailleurs, il ne propose aucune autre façon de protéger le mariage.

De son côté, Mr Svend J. Robinson, au nom du Nouveau Parti Démocratique, exprime, lui aussi, la tension entre le mariage et le divorce dans ces termes : « Of course we want to do everything in our power to strengthen marriages and the role of the family in our society. However, where relationships have broken down, we should not be perpetrating measures which simply add to the pain, suffering and hardship involved in what is already a very difficult situation »[24].

Tout en reconnaissant la dimension positive de cette attitude envers les personnes qui souffrent, manifestée par toutes les tendances politiques au Parlement, on peut se demander ce que l'on fait pour protéger le mariage et fortifier la famille. *Faltus vocis* ! des paroles vides. Prétendre qu'on désire fortifier le mariage et la famille tout en sanctionnant une loi ne comportant aucune mesure visant la famille est une attitude inqualifiable.

Une seule voix politique a osé le dire : « Je m'oppose aux projets de loi . . . parce qu'à bien des égards, ils représentent à mes yeux une abdication des responsabilités à l'égard de la famille »[25]. Le Sénateur Bélisle avait signalé ces responsabilités : « Si nous nous devons de rendre le divorce plus humain, nous avons également le devoir et la responsabilité—et je n'hésite pas à parler de responsabilité morale—de tenir compte du lien du mariage, de le protéger et de faire respecter les devoirs qui en découlent. Je ne pense pas que ce projet de loi y parviendra »[26].

22 *Id.*, p. 4935.
23 *Id.*, 22 May, 1985, p. 4970.
24 *Id.*, p. 4974.
25 *Débats du Sénat*, 1re sess., 33e lég., Vol. CXXX, 1986, 4 février, 1986, p. 1947.
26 *Id.*, p. 1946.

Sommes-nous en train d'évoluer ou s'agit-il d'une involution ? Il semble assez évident que dans ce domaine l'hypocrisie et la contradiction ont bonne presse et le bon sens devient l'exception.

Vous comprendrez pourquoi je me sens si mal à l'aise : quand le législateur me dit une chose et fait le contraire, je ne peux pas me sentir à l'aise. Qui est en train de tromper qui ? La pièce de Ionesco, *Les rhinocéros*, serait-elle donc vraie ? Serions-nous en train de devenir des rhinocéros et de perdre notre rationalité ?

La tension entre le mariage et les unions de fait

Le type de tension observé entre le mariage et le divorce existe aussi entre le mariage et les unions de fait. En droit commun, dans le Code civil, il n'y a que le mariage qui ait droit de cité. Il est envisagé, réglementé, organisé. Les unions de fait n'existent pas en droit commun. Mais plusieurs lois dites sociales, et dont l'impact économique n'est pas négligeable, reconnaissent aux unions de fait le même statut qu'au mariage, et privilégient même parfois celles-là aux dépens de celui-ci, préférant dans certaines circonstances le compagnon ou la compagne à l'époux.

Contradiction ? Hypocrisie ? Convenance ? Il est difficile de juger. Une chose est pourtant certaine : le législateur accorde des droits aux conjoints de fait par voie de définition. Il est coutumier pour le législateur dans les lois dites statutaires de définir ses termes. Ces définitions seraient superflues, si le législateur s'en tenait au sens usuel des mots, mais elles deviennent nécessaires lorsqu'il souhaite donner aux mots un sens particulier. C'est ainsi que l'on définit dans les lois sociales des termes tels que « conjoint », « époux », « conjoint survivant », et autres semblables. Ce qui donne lieu à un véritable « charivari » terminologique, parfois contradictoire, où l'on confère plusieurs sens aux mots « mariage » ou « conjoint survivant ». Le législateur s'est même permis d'établir plusieurs types de « mariages ». C'est ainsi que l'on se retrouve avec le mariage *stricto sensu*, mais aussi avec des personnes qui auront acquis le statut de conjoint par prescription. C'est le cas des personnes ayant cohabité pendant un certain temps (trois ans, sept ans, etc., selon les diverses lois) ou encore des personnes ayant cohabité pendant un an et ayant eu un enfant[27].

La rigueur intellectuelle en prend pour son rhume. Et le dictionnaire aussi. Et nous voilà tous heureux d'avoir fait un pas en avant, sans nous rendre compte toutefois que ce pas en avant laisse un conjoint légitime dans le plus grand désarroi et se demandant de quel droit le législateur le prive de ses propres droits, comme nous le verrons tout de suite.

À la rigueur, on ne peut reprocher au législateur de disposer que la prestation prévue pour le conjoint du défunt ou de la victime d'un accident soit versée à la

27 Voir, par exemple, *Loi sur les accidents de travail*, L.R.Q. 1977, c. A-3, art. 2 ; *Loi sur le supplément au revenu du travail*, *id.*, c. S-37.1, art. 1 ; *Loi sur le régime des rentes du Québec*, *id.*, c. R-9, art. 91.

personne qui cohabitait avec lui, lorsque le défunt ou la victime n'avait pas ou n'avait plus d'obligations financières envers des membres de sa famille (époux ou enfants). Mais lorsqu'il s'agit d'une personne mariée qui subvenait aux besoins de son époux et de ses enfants, tout en cohabitant avec une autre personne, et qu'à son décès la loi exige que la rente soit versée au concubin plutôt qu'à l'époux, laissant celui-ci sans pension alimentaire et sans rente, alors apparaît le caractère contradictoire de la loi. C'est ce qui se produit, par exemple, avec le Régime des rentes.

Il est vrai que les dispositions de cette loi sont rédigées de façon à bénéficier le conjoint légitime[28]. Mais en présence d'un conjoint légitime et d'un concubin, si celui-ci a cohabité pendant au moins sept ans avec la personne décédée, le conflit sera tranché en faveur du concubin.

Dans un jugement de la Cour supérieure, le juge, forcé d'appliquer cette loi, a senti le besoin de se justifier ainsi : « Il peut paraître étonnant qu'un conjoint légitime survivant qui n'a rien à se reprocher soit ainsi privé du bénéfice d'une lois sociale au profit d'une personne à laquelle légalement rien ne lie le cotisant défunt. Il s'agit là d'une situation que le législateur a clairement voulu »[29].

Ainsi le conflit entre le mariage et les unions de fait peut se résoudre dans certains cas au profit de ces dernières.

Le législateur n'est-il pas en train de se contredire ? Il accorde sa faveur au mariage dans le Code civil, et aux unions de fait dans des lois sociales. Répétons-le : qu'on reconnaisse des effets juridiques et même économiques à la cohabitation lorsqu'elle n'entre pas en conflit avec le mariage, soit ! Mais que le fait l'emporte sur le droit, et de surcroît dans la législation, apparaît comme une incohérence pure. Est-ce une évolution ? Est-ce une involution ? Je pense que vous comprendrez mon malaise : ces gestes du législateur comportent tout à la fois des éléments d'évolution et des éléments d'involution ; on est donc forcé de se demander : qu'a-t-on fait du principe de non-contradiction ?

Il me semble que ces quelques exemples mettent en évidence le malaise d'un législateur qui a mis au rancart des notions juridiques fondamentales et les principes du raisonnement. À force de ménager la chèvre et le chou, on finit par oublier son rôle. Mais il nous faut nous tourner vers les enfants.

LES ENFANTS

Les réformes législatives concernant les enfants ont aussi donné lieu à ce mélange d'évolution et d'involution dont j'ai parlé. Je me limiterai à deux questions : l'égalité en droit et les inégalités en fait, d'un côté et, de l'autre, ce que l'on pourrait appeler la confusion des noms.

28 *Loi sur le régime des rentes du Québec*, note 25, arts 91, 91.1 et *passim*.

29 *Bédard* c. *C.A.S.*, C.S. Mtl 500-05-013915-796, 1er octobre, 1980, j. V. Melançon, p. 13 (*pro manuscripto*). Voir aussi *Régime des rentes—37*, [1976] C.A.S. 441 ; *Régime de rentes—16*, [1976] C.A.S. 380.

L'égalité en droit, les inégalités en fait

Jadis les enfants n'étaient pas juridiquement égaux et les codes les qualifiaient en tenant compte de la situation juridique de leurs parents. On y trouvait des enfants légitimes et illégitimes et, parmi ces derniers, il y avait des enfants naturels, adultérins et incestueux. Ces distinctions ont généralement été supprimées de tous les ordonnancements juridiques afin de traiter tous les enfants également, indépendamment des conditions de leur naissance.

Les ordonnancements juridiques visaient jadis la protection de la famille légitime en traitant différemment les enfants selon leur origine. Le problème était alors que la sanction du comportement antisocial des parents retombait sur les victimes innocentes, les enfants[30]. De toute évidence, bien que le but recherché pût être considéré comme bénéfique pour la société, le résultat était pour le moins contestable. D'abord, parce qu'en droit on n'impose jamais une sanction à la victime d'un comportement considéré antisocial, mais plutôt à ses auteurs. Ensuite, parce que ces sanctions fondamentalement patrimoniales imposées aux enfants nés hors mariage ou contre mariage n'ont jamais empêché leur conception. Enfin, comme on peut bien s'en rendre compte, parce que les sanctions n'atteignaient pas leur objectif. Aussi, afin de protéger les plus faibles, soit les enfants dépourvus d'un cadre familial et de moyens financiers, les législateurs ont voulu procéder à des modifications.

La solution généralement adoptée par les législateurs contemporains a été l'établissement d'une égalité juridique. Ainsi, par exemple, l'article 594 du *Code civil du Québec* édicte : « Tous les enfants dont la filiation est établie ont les mêmes droits et les mêmes obligations, quelles que soient les circonstances de leur naissance. » Mais il est permis de se demander si une déclaration d'égalité juridique, aussi solennelle soit-elle, établit en fait l'égalité entre les enfants.

La réalité apparaît bien différente. L'enfant né hors mariage ou contre mariage pourrait se trouver dans un contexte où le cadre familial requis pour son épanouissement est inexistant. Certes, de nos jours, la naissance dans le mariage ne garantit pas toujours la stabilité requise pour un tel épanouissement. Et des parents non mariés peuvent parfois assurer un cadre sociologique favorisant un tel épanouissement.

Mais le problème reste entier. En décrétant l'égalité juridique des enfants, le législateur ne s'est pas attaqué à la réalité. Il a plutôt créé une nouvelle fiction.

Le problème est peut-être insoluble juridiquement puisqu'il s'agit essentiellement d'un problème de comportement, de mœurs, de projet de société. Mais le malaise dont je vous ai parlé demeure même lorsque le législateur prétend évoluer, résoudre un problème, alors qu'en réalité il ne fait que le déplacer.

Normalement l'enfant né hors mariage, et davantage celui né contre le

30 Pour une présentation historique et des perspectives dans ce contexte voir J. Goulet, « La protection juridique de l'amour », (1965–66) 7 *C. de D.* 243–285.

mariage, exige une attention plus poussée, car il se trouve dans une situation différente, voire inégale, par rapport à l'enfant né dans le mariage. Aristote affirmait : « Si les personnes ne sont pas égales, elles n'obtiendront pas dans la façon dont elles sont traitées, l'égalité. De là viennent les disputes et les constestations, quand des personnes sur le pied d'égalité n'obtiennent pas des parts égales, ou quand des personnes, sur le pied d'inégalité, ont et obtiennent un traitement égal »[31].

Ce principe de la justice distributive aurait dû guider le législateur dans sa recherche d'une solution au problème des inégalités chez les enfants. Cela aurait, sans doute, exigé qu'il se penche davantage sur le tissu social et qu'il envisage un nombre considérable de mesures sociales. Mais en se contentant de décréter que tous les enfants sont égaux, il pose un geste qui risque de n'être évolutif qu'en apparence. On peut se demander s'il n'est pas en train de favoriser l'involution.

La confusion des noms

Sous la poussée de mouvements féministes, les législateurs ont été confrontés à la question du nom patronimique des enfants et même à celle du nom des familles. Parce que la tradition, plutôt que le droit, identifiait les familles par le nom du père, et que celui-ci le transmettait aux enfants, on a conclu qu'il y avait discrimination envers les femmes et qu'il fallait corriger cette situation. La question du nom est devenue un symbole de ralliement pour la lutte contre l'unité et la stabilité de la famille, lutte que l'on camoufle en noble combat contre la discrimination. Les efforts en vue de diversifier les noms des enfants, même ceux issus d'un couple unique, se justifient davantage par un désir de faire disparaître l'unité de la famille et l'identité des membres d'une même famille que par celui de perpétuer le nom de la mère.

En effet, la diversité des noms des enfants d'une même famille constitue un écran de fumée qui permet de cacher les transferts d'enfants d'un couple à l'autre.

Si le but recherché avait été de conserver le nom de la mère, la solution juridique logique aurait été d'imposer le nom de la mère comme nom de famille. L'acceptation d'un tel changement aurait sans doute été difficile, mais la solution aurait été cohérente et aurait permis de sauvegarder l'identité et l'unité de la famille.

Le législateur québécois, pour ne prendre que cet exemple, a modifié le *Code civil du Bas-Canada* en y introduisant l'article 56.1 qui se lit : « On attribue à l'enfant, au choix de ses père et mère, un ou plusieurs prénoms ainsi que le nom de l'un d'eux ou un nom composé d'au plus deux parties provenant des noms de ses père et mère. » On se rappellera certaines textes, publiés dans des journaux et marqués au coin de l'humour, qui présentaient des variations fort cocasses

31 Aristote, *Ethique de Nicomaque*, liv. 5, chap. III, no. 6, Trad. établie par J. Voilquin, Paris, Grenier, 1950, p. 207.

des noms qu'on pourrait trouver chez les enfant d'un même couple. C'était faire de l'humour avec une question plutôt sérieuse.

En effet, cette nouvelle disposition ouvre la voie à la confusion des noms. De l'aveu des féministes, c'en est même le but principal : « éliminer les répercussions des pressions sociales qui servent à renforcer le concept de la famille unie, autour du mari-père »[32].

CONCLUSION

J'ai essayé de mettre en relief le fait que le législateur semble poursuivre un double objectif : l'un avoué, qu'il n'atteint point, l'autre inavoué (serait-il inavouable ?) mais néanmoins perceptible à travers les effets de la loi.

Ces effets ne sont pas très heureux. Le tissu social se détériore à vue d'œil, les trous deviennent tellement grands qu'on ne réussit plus à les raccommoder. Si vous croyez que l'on pourra boucher ces trous à coup de rapiéçage, je vous propose de méditer sur un problème dont personne ne conteste l'existence mais pour lequel il n'existe aucune solution juridique : c'est que la deuxième cause la plus importante de mortalité chez les jeunes, c'est le suicide.

Je pourrais étendre mes réflexions au domaine de la famille où, tout en maintenant l'obligation de fidélité entre conjoints, on donne à la femme le droit de désavouer son mari comme père de son enfant. Je pourrais aussi traiter de l'application uniforme du droit fiscal au mariage et aux unions de fait, qui crée inévitablement des éléments discriminatoires envers les personnes mariées. Ou du domaine contractuel, où le désir de protéger le consommateur nous fait passer du contrat léonin à l'incapable tout-puissant. Ou encore de celui des droits fondamentaux, dont on parle plus que jamais alors même que le plus fondamental de tous les droits, le droit à la vie, est bafoué tous les jours, et ce avec l'aide financière de l'État merci ! Comme vous pouvez le constater, la cause de mon malaise est assez sérieuse. Elle tient au fait que les législateurs ne veulent plus assumer leur rôle : ayant décidé de se laisser ballotter au gré des sondages et d'écouter les vociférations des groupes de pression idéologique, ils sont en train d'extirper, une à une, nos racines culturelles.

Les racines judéo-chrétiennes de notre civilisation occidentale avaient donné une assise à la famille, cellule fondamentale de notre société, et à notre système juridique. Certes, la nature humaine étant ce qu'elle est, tout n'allait pas pour le mieux dans le meilleur des mondes. Bien des choses devaient être améliorées, et beaucoup l'ont été au long des siècles. Le problème actuel tient au fait qu'on présente comme des évolutions les opérations de démolition de nos fondements culturels, opérations que l'on effectue gaiement sans même se soucier de chercher ou de proposer d'autres fondements.

C'est ainsi que l'on en vient à ériger l'incohérence en système !

32 S. P. Boivin, « Le nom de la femme mariée et des enfants », dans *Le droit de la famille au Canada : nouvelles orientations*, Ottawa, Conseil consultatif canadien de la situation de la femme, 1985, pp. 205–220, à la p. 217.

EVELYNE LAPIERRE-ADAMCYK*

La famille canadienne au XX^e siècle : quelques transformations de son caractère institutionnel†

LES DEUX DERNIÈRES décennies ont été le théâtre de transformations importantes de la famille dans l'ensemble du monde occidental. La famille canadienne n'a pas échappé à ce mouvement de fond marqué par trois phénomènes : réduction substantielle du nombre d'enfants désirés par les couples, accroissement de l'instabilité conjugale et montée de la cohabitation comme mode de vie des couples.

Du point de vue du caractère institutionnel de la famille, l'instabilité conjugale et la cohabitation sans mariage touchent à deux de ses dimensions fondamentales. En effet, dans nos sociétés, jusqu'à tout récemment, la famille se fondait sur le mariage légal des époux. Le mariage, seul cadre reconnu par tous pour la vie de couple et la procréation et l'éducation des enfants, était une union à caractère *permanent*, adoptée par *l'immense majorité* comme mode de vie. Le mariage avait donc un caractère quasi universel et quasi irrévocable. Les nouveaux comportements mettent en cause l'existence de ces caractéristiques ; c'est l'ampleur de la diffusion de ces comportements que nous illustrerons pour cerner l'importance des modifications que la famille subit.

Les instruments mis au point par la démographie sont particulièrement appropriés pour mesurer le changement familial dans ses tendances de fond. Deux aspects retiendront l'attention parce qu'ils représentent le caractère institutionnel de la famille : la quasi-universalité du mariage et la stabilité du mariage.

A. LA QUASI-UNIVERSALITÉ DU MARIAGE

Dans les sociétés occidentales modernes, la très grande majorité des hommes et

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TABLEAU 1
Proportion de personnes déja mariées à 25 et 30 ans, générations 1921 à 1960, Canada (%)

	Hommes		Femmes	
Générations	à 25 ans	à 30 ans	à 25 ans	à 30 ans
1936–1940	64,1	83,7	80,7	91,1
1941–1945	60,5	81,3	81,4	89,9
1946–1950	63,2	83,5	76,6	86,9
1951–1955	60,7	77,0	71,7	80,7

SOURCE : Enquête sur la famille de Statistique Canada, 1984.

des femmes se marient. Le célibat définitif, qui est représenté par le pourcentage des hommes ou des femmes encore célibataires à l'âge de 50 ans, n'est le fait que d'une faible fraction des générations. Ainsi, au Canada, pour les générations qui ont atteint 50 ans au cours des décennies récentes, le célibat définitif a très peu varié : 5 à 12% des générations. C'est donc dire que le mariage était presque universel.

C'est au milieu des années 1970 que les changements ont commencé à se manifester. En 1972, le nombre annuel de mariages atteignait un maximum : un peu plus de 200,000. Depuis cette année-là, ce nombre s'est réduit graduellement, la baisse étant plus forte pour les mariages de célibataires. Cette réduction du nombre de mariages prend une allure plus dramatique quand on la présente grâce à des indicateurs qui tiennent compte des effectifs qui arrivent à l'âge au mariage. L'indicateur conjoncturel de la nuptialité, qui permet de résumer les taux de nuptialité d'une année sous la forme d'une proportion de personnes qui se marieraient avant l'âge de 50 ans, est passé de plus de 90% en 1972 à moins de 65% en 1985 ; il s'agit d'une baisse très rapide, suffisamment profonde, pour que l'opinion se répande que les jeunes ne se marient plus.

Cependant, la propension à se marier ne s'est pas effondrée de façon aussi profonde que ces données le laissent entendre. Quand on examine la proportion des hommes et des femmes qui sont déjà mariés à 25 et à 30 ans (tirées de l'Enquête sur la famille de Statistique Canada), on voit au tableau 1 que chez les générations nées au cours des années 1950, le mariage est encore assez populaire, malgré un recul indéniable ; ce recul est d'ailleurs difficile à interpréter : il peut signifier un rejet du mariage par une fraction de plus en plus grande, mais il peut aussi être un effet d'une hausse de l'âge au mariage. Seul le comportement observé au cours des prochaines années permettra de trancher.

Qu'il s'agisse d'un retard de l'âge au mariage ou d'un rejet de ce dernier, un fait demeure : la propension à vivre en couple n'a pas diminué de façon aussi nette. On voit ce fait au tableau 2, à l'aide de l'exemple des femmes âgées de 22 et 25 ans en 1971 et 1981. La réduction de la propension à vivre en couple est deux fois moins importante que celle du mariage légal. Ces données confirment la diffusion récente de la cohabitation sans mariage comme mode d'union chez

TABLEAU 2
Indices de la propension à vivre en couple

	Femmes vivant en couple			Femmes déjà mariées légalement d'après l'état civil		
Age	1971	1981	% de réduction	1971	1981	% de réduction
22	58,6	50,1	14,5	56,1	40,4	28,0
25	79,8	73,1	8,4	78,0	64,7	17,1

SOURCE : Péron, 1986, p. 23.

les générations qui ont atteint l'âge au mariage au cours des années 1970. On constate, par ailleurs, au recensement de 1981, que parmi les couples une fraction non négligeable sont des couples non mariés ; égale à 6,3% de l'ensemble des couples, cette fraction atteint presque 50% dans le cas où la femme est âgée de 15–19 ans, 20% où elle à 20–24 ans et 10% où elle a 25–29 ans (Statistique Canada, 1987, p. 29).

À ces informations s'ajoute aussi l'importance relative des mariages précédés de cohabitation. On sait, grâce à l'Enquête sur la fécondité au Canada réalisée en 1984, que seulement 3,5% des femmes mariées à la fin des années 1960 avaient déjà vécu en union libre ; cette proportion atteint 25% pour les mariages conclus dix ans plus tard et augmente à près de 40 pour cent en 1980–1984.

En bref, on observe un recul indéniable du mariage légal, une montée de l'union libre et la légalisation d'une certaine partie de ces unions libres. Ces phénomènes sont encore trop récents pour que l'on puisse conclure quant à leur signification réelle : le mariage est-il en voie d'être remplacé par un mode d'union beaucoup moins formel ou la « cohabitation » est-elle en voie de devenir une première étape dans la vie de couple à travers laquelle l'immense majorité mettra ses sentiments et son désir de vivre ensemble à l'épreuve ? On sait que la première union est de plus en plus souvent une cohabitation et que la légalisation se fait de plus en plus tardive ; d'un autre côté, l'examen des intentions exprimées (Enquête sur la fécondité, 1984) par les jeunes femmes de moins de 35 ans révèle que le choix de la cohabitation comme seul mode d'union, donc comme substitut au mariage, n'est le fait que d'une faible minorité des Canadiennes, environ 5%. Par contre, 43% indiquent que leur préférence va à la cohabitation suivie d'un mariage et 52% retiennent le mariage comme choix unique.

Ces intentions manifestent-elles l'émergence d'un nouveau modèle qui, pour un temps plus ou moins long, fera concurrence au mariage légal ? Pour essayer de répondre à cette question, il est intéressant d'examiner les variations des attitudes des jeunes femmes sur quelques points liés à la conception que l'on peut se faire du mariage. Le tableau 3 présente ces résultats. Il n'est pas utile de

TABLEAU 3
Indicateurs de la faveur accordée au mariage

Intentions à l'égard du mariage et de la cohabitation	% qui trouvent le mariage nécessaire à la vie de couple et à l'éducation des enfants	% qui valorisent moins l'autonomie personnelle	% qui attachent le plus d'importance à l'enfant	% qui manifestent quelques réserves à l'égard du divorce
Cohabitation seulement	6	36	22	56
Cohabitation et mariage	36	42	36	62
Mariage seulement	66	49	43	72
Total	50	45	39	66

SOURCE : Enquête sur la fécondité au Canada réalisée en 1984 sous la direction de T.R. Balakrishnan, K. J. Krotki et E. Lapierre-Adamcyk.

décrire en détail le contenu de ce tableau. Retenons les éléments suivants :

- seules les femmes qui choisissent la cohabitation comme substitut au mariage se révèlent nettement différentes des autres ; elles représentent une faible minorité ;
- les deux autres groupes, qui font place au mariage dans leur horizon, se ressemblent beaucoup et ne s'éloignent l'un de l'autre que par l'importance qu'ils attachent au mariage.

Étant donné la proximité des attitudes entre les deux derniers groupes, il semble plausible que la cohabitation vue comme un prélude au mariage continue de progresser. Par contre, dans un contexte où la réprobation sociale n'exerce plus de pression en faveur du mariage, il est aussi fort plausible que le report du mariage entraîne sa remise à jamais pour un plus grand nombre que ce que les intentions permettent d'identifier.

Comportements déjà observés, intentions exprimées et attitudes vont dans une même direction : avènement d'une société où le mariage continuera d'avoir une place, cette place sera réduite et la nature même de l'union ne sera plus la même, n'étant plus considérée comme le seul cadre acceptable pour la vie du couple.

B. LA STABILITÉ DU MARIAGE

Antérieurement à la diffusion de la cohabitation, l'instabilité conjugale avait déjà touché à la nature du mariage traditionnel qui était, dans les faits au Canada, presque irrévocable. En dépit de l'existence de lois permettant le divorce, celui-ci restait relativement rare et ce n'est qu'au cours des années 1970 que les taux de divorce ont augmenté considérablement.

Les indices conjoncturels annoncent des taux de ruptures d'unions très élevés, fort probablement trop élevés pour traduire correctement la réalité. Malgré l'impression très répandue, il faut constater que la majorité des couples mariés le restent jusqu'à la mort de l'un des conjoints. Burch (1986) illustre bien ces probabilités de divorcer : en moyenne les promotions de mariage de 1934–44 n'ont connu que 13% de divorce, à 40 ans de mariage ; celles de 1945–59, 19% à 35 ans de mariage ; cependant cette probabilité est atteinte à 15 ans et à 10 ans de mariage respectivement par les cohortes de 1960–69 et de 1970–74. Cette précocité de plus en plus grande du divorce confirme la hausse de la propension à divorcer ; on peut s'attendre à ce qu'environ 30 à 35% des cohortes de mariage divorcent un jour.

L'image de l'instabilité des unions, déjà amplifiée par les nombreux divorces des années 1970 qui ne faisaient que rendre officielles les désunions d'avant la loi de 1969 et par la précocité des ruptures dans les cohortes récentes, est aussi renforcée par la précarité des cohabitations. Presque par définition, la cohabitation sans mariage est une forme d'union dont le caractère n'est pas permanent : souvent, les couples qui s'y engagent souhaitent qu'il en soit ainsi. Les observations de l'enquête de 1984 montrent qu'après 5 ans, 30% des cohabitations se sont déjà rompues ; cette proportion atteint environ 12% pour les mariages (Burch, 1986). Ces données confirment toutefois l'impression que les unions sont souvent instables ; même si le plus grand nombre continuera de se conformer au modèle traditionnel, la proportion de ceux et celles qui s'en éloigneront est suffisamment forte pour que l'on affirme que le caractère institutionnel du mariage a profondément changé. En supposant que les intentions des jeunes femmes se réalisent, il reste possible que le mariage conserve une certaine popularité ; toutefois, il sera très souvent précédé d'une ou plusieurs cohabitations ; de plus, même s'il sera considéré comme un engagement permanent, ce dernier n'aura plus le caractère irrévocable qu'on lui connaissait.

CONCLUSION

Les observations que nous venons de présenter démontrent à l'évidence que le mariage traditionnel n'a plus, au moins selon deux aspects fondamentaux, son caractère quasi universel et quasi irrévocable.

Il est difficile de cerner les causes de cette transformation radicale. Bien sûr, on peut répéter ce qui a souvent été dit : les grands changements sociaux et économiques qui accompagnent la mise en place de la société post-industrielle sont à la base de cette réorganisation de la cellule familiale. Enrichissement des sociétés, montée de l'individualisme, libération de la femme, tous ces facteurs jouent leur rôle et contribuent aux changements.

Pour le démographe, il apparaît assez clairement que la famille du XX^e siècle, qui s'était affranchie des contraintes économiques les plus astreignantes, conservait sa fonction de procréation et de socialisation des enfants tout en

permettant l'épanouissement des époux. Peut-on avancer qu'ultimement les causes de la baisse de la fécondité, elles-mêmes assez mal identifiées, auront provoqué le recul du mariage ? Il est certain que la réduction du nombre d'enfants, la disparition des familles nombreuses et, surtout, la possibilité de maîtriser la fécondité presque parfaitement, changent complètement le contexte dans lequel les jeunes couples envisagent l'engagement qu'ils prennent au début de leur vie commune.

La maîtrise de la reproduction nous fait entrer dans un nouveau régime dont la diffusion des méthodes contraceptives efficaces, pilule et stérilisation, n'est sans doute que le premier jalon. Tout le développement de ce qu'on appelle « les nouvelles technologies de la reproduction » est encore à venir. Si la mise en question du mariage que nous traversons renouvelle ou transforme la nature du lien entre les hommes et les femmes, la maîtrise de la reproduction semble entraîner la société vers une reconsidération plus profonde et plus dramatique encore qui est celle du lien entre parents et enfants.

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ACADEMY II

Academy of the Humanities and Social Sciences

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Archaeology as Palaeobiology†

AMONG THE MANY materials often found in archaeological sites are a wide variety of biological remains. In open sites of temperate and sub-arctic areas, these remains commonly include seeds, snails, and the bones of mammals, birds, and fishes. Some sites, such as perenially dry, water-logged, or frozen deposits, contain an even wider variety of biological tissues including plant fibers and bark, and the soft tissues of animals. An obvious contribution of biology to archaeology has been the identification of such materials. Until relatively recently, it was common to find a so-called laundry list of identified species in an appendix to an archaeological site report. The appendix might not even be referenced in the text, and little or no interpretation was offered in many such reports. In fact, it was implicitly assumed that all of the species in the list had somehow contributed to the diet of the people whose artifacts were found in the site. Archaeologists seldom considered, perhaps could not conceive, that events unrelated to human behaviour might be recorded in the site.

Such tunnel vision reached absurd proportions in the case, for example, of a French Mousterian site where the conspicuous evidence of carnivore gnawing on the bones was believed to be attributable to the actions of dogs that must have been domesticated by Neanderthal man (Martin, 1906)! It did not occur to the analyst that the surface scatter of bones left behind by Neanderthal man might have been scavenged by wild carnivores. Likewise, the presence of abundant small terrestrial snails in both North American and European sites was widely interpreted as of dietary importance, and speculation centred on what sort of small items could have been used as tools to extract the tiny molluscan bodies

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from their shells (see Bobrowsky, 1984)! Most analysts now accept such snails, as well as a host of other animals and plants, as natural residents of the site locality whose interaction with human occupants is either nil or can be revealed only through painstaking analysis.

The main focus of this discussion will be the emerging framework for that kind of painstaking analysis. Archaeology is reaping benefits from concepts developed by palaeobiologists and subsumed under the label "taphonomy." This term was coined by I.A. Efremov (1940), a Russian palaeontologist, and it means "the science of the laws of embedding." In current usage it refers to all aspects of the history of a fossil in its transition from the biosphere to the lithosphere, a transition that can be modelled in several ways. One of the first general models was devised by Clark and Kietzke (1967) during their study of Oligocene deposits in the Dakota badlands. It portrays a series of factors that influence the composition of a series of assemblages (Table 1, first column). Biotic factors shape the life assemblage; causes of death shape the death assemblage; peri-mortem factors and mode of burial influence the composition of the burial assemblage; diagenetic factors such as weathering and erosion may further alter the burial assemblage or may send it through one or more cycles of redeposition; sampling methods and techniques shape the collection of fossils. In the laboratory, factors such as the specialized interests or competence of the analyst influence the analytical results. Hanson (1980) has transplanted many of these ideas into a cartoon that enlarges upon the problems associated with fluvial redeposition and stops short of sampling and analytical questions. In both models there is a strong emphasis on the subtractive tendencies of taphonomic processes that are seen to impose various biases on the fossil record. In fact, as Gifford (1981: 385, her italics) notes, the processes, even if destructive, "are essentially *ecological* in nature and operation," so that their traces are relevant to the palaeontological or archaeological inquiry and should be investigated, rather than corrected for, in a taphonomic analysis.

Gifford (1981) offers a model that focuses on individual anatomical elements and depicts a series of contexts linked by a series of transformations (Table 1, second column). She also identifies sources of biological and geological theory that are relevant to each context (Gifford 1981). For the purposes of archaeological analysis, I would add ethnographic and archaeologic theory to the biostratinomic and diagenetic considerations. Our knowledge of global hunting and gathering practices should be brought to bear upon the reconstruction of death and burial transforms, and our recognition of site formation processes and cultural features, such as habitations, hearths, and storage pits, is relevant to burial and diagenetic transformations. I will use this model to illustrate a case study in which taphonomic analysis is applied to a bone assemblage from an archaeological site.

The case study concerns a late prehistoric site in central Saskatchewan where I am collaborating with Dr. Ernest G. Walker of the University of Saskatchewan. Known as Tipperary Creek, the site is one of twenty in the future home of

TABLE 1
Taphonomic models devised by Clark and Kietzke (1967) and Gifford (1981) applied to interpretation of amphibian bones from the late prehistoric Tipperary Creek site, Saskatchewan. See text for explanation of pathways.

Clark and Kietzke (1967)	Gifford (1981)	Probable pathways	Improbable pathways
Biotic factors			
Life assemblage (biocoenosis)	Anatomical context	Frogs and toads	
Thanatic factors (causes of death)	Death transforms	a. Hawk / owl predation b. Dog predation (frogs) c. Winter kill (chorus and wood frog)	Human predation Dog predation (toads) Winter kill (leopard frog and toad)
Death assemblage (thanatocoenosis)	Surface context	a. Regurgitated pellets b. Bones in feces c. Articulated carcasses	
Perthotaxic (peri-mortem) factors		Sub-aerial decay?	
Taphic factors (burial)	Burial transforms	Overbank sedimentation	
Burial assemblage (taphocoenosis)	Sedimentary context	Burial in alluvium	
Anataxic (diagenetic) factors	Diagenetic transforms	Soft tissue decay	
	Fossil context	Buried "loose" bones	
Sullegic (collecting) factors	Sampling transforms	Trowelling and screening disaggregate bones	
Collection	Sample context	Bones hand-picked from sample	
Trephic (laboratory) factors	Description transforms	Identification Distribution in site	
	Observational data	Life history data Pellet formation data	

Wanuskewin Heritage Park located at the northern edge of the city of Saskatoon (Walker *et al.*, 1986). Sixteen cultural levels are separated from one another by sterile alluvial sediments comprising a point bar approximately two meters thick. Radiocarbon dates show that the entire deposit dates within the last two or three millennia, and the recovered artifacts represent northern Plains cultures of late prehistoric and early historic time.

In this study we are interested in how and why individuals of particular species died at such a place and time that their bones can be found in association with artifacts and cultural features at the Tipperary Creek site. That these species lived on or near the site comes as no surprise, because they do so today. That their remains are in the site deposits demands explanation in terms of cultural and / or non-cultural taphonomic pathways. It would be most convenient simply to assume that all of the plant and animal remains recovered from

the site represent food sources for the people who lived there and that variations in the frequency of these remains reflect dietary preferences. This is demonstrably not the case, and taphonomic analysis is a convenient means of factoring out the culturally significant elements of a complex palaeobiological record.

During the 1986 excavation, routine water-screening was added to the repertoire of recovery techniques in use at the Tipperary Creek site (Morlan, 1987). By this technique we recovered small chert flakes, ceramic sherdlets, snails, insect fragments, fly puparia, seeds, scats, charcoal, birds' eggshells, crustaceans, bones, and many other interesting items. The bones represent large and small mammals, birds, fishes, and amphibians. I will focus this discussion on the amphibians, because they represent one of the most enigmatic data sets we have encountered.

Of 293 water screened samples from 16 cultural levels in a 20 square meter excavation, 164 samples have been sorted thus far. They yielded 954 bones of frogs and toads that represent at least four species: chorus frog, leopard frog, wood frog, and Canadian toad. The bones are neither randomly nor uniformly distributed. Less than 5 per cent of the samples contain more than half of the bones, with as many as 108 bones (11.3 per cent) in a single sample. Floor plans for the two levels where all samples have been examined likewise exhibit anomalous distributions, and the anomalies are not associated with cultural features, such as hearths and bison bone concentrations that were mapped during excavation (Figure 1). There are no ethnographic data to suggest that northern Plains Indians ever ate frogs and toads, although frogs have an important place in cosmology as a link between the world of water and the world of land (T. Brasser, personal communication, 1987). Since the bones are not associated with cultural features they may have had nothing to do with the human occupations. But why are there so many amphibian bones in the site?

Both bones and scats show that dogs were present on the site during many of the human occupations. Dogs might have captured and eaten frogs and deposited the bones in feces, but they would not eat toads whose parotoid secretions can paralyze or kill a dog (Stebbins, 1966: 58). Winter kill might account for some of the remains, but the four species have differing strategies for surviving winter. The Canadian toad might burrow into the site, but it is capable of resuming its burrowing activity if the frost line approaches, and therefore rarely suffers winter kill (F. Cook, personal communication, 1987). The leopard frog burrows beneath bodies of water that are large enough not to freeze to the bottom (*ibid.*), so it could not spend the winter on the site. The chorus frog and wood frog do not burrow into the ground, because they "have acquired the ability to tolerate extracellular freezing as an adaptation for hibernation at the soil surface where freezing temperatures cannot always be avoided" (Storey and Storey, 1986: 617). However, they require a protective cover of leaves, rocks, and logs or tree roots, and a blanket of snow (Storey and Storey, 1986: 616). They might not survive winter if the insulating layer were

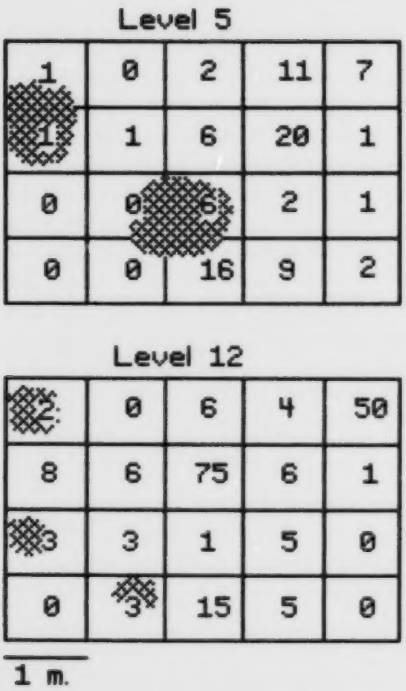

FIGURE 1. Distributions of amphibian bones in Levels 5 and 12 at the Tipperary Creek site. Mapped cultural features are cross-hatched.

reduced by high winds, so their carcasses could be introduced to the site surface. Winter kill might account for occurrences of the chorus and wood frog either alone or together, but it cannot explain some of the larger samples that contain these species as well as leopard frog and toad.

The most likely process for creating mixed amphibian assemblages is predation by hawks and owls, raptorial birds that could regurgitate pellets from a habitual perch (Table 1, third column). Of 24 species of raptors that live in central Saskatchewan, 13 are known to prey on frogs and six have been found to eat toads without ill effects (Bent, 1937–38). The pellets might undergo some degree of decay while on the surface, and after burial in the site the soft tissue would decay completely. There would remain a series of pellet-shaped aggregates of loose bone that would be readily disturbed and disaggregated by the trowelling and screening techniques used to sample the site deposits. The bones are hand-picked from the dried samples and present themselves to the analyst as individual specimens. Perhaps their taphonomic histories will become clearer when the identifications are complete and the anatomical

elements have been tabulated. The condition of individual elements must also be compared with amphibian bones known to have been extracted from raptor pellets in order to test the model I have proposed for Tipperary Creek.

This case study illustrates the value of taphonomy in the analysis of a specific archaeological problem. More generally, taphonomy has focused attention on processes of site formation and has promoted the realization that nearly all sites are palimpsests—that is, deposits that record juxtapositions of many cultural and non-cultural events (Binford, 1981; Gifford, 1981). But the contributions of biology to archaeology are much greater than the borrowing of taphonomic analysis. The subdisciplines of zooarchaeology and archaeobotany have grown in response to the need for thorough analysis of biological remains recovered from archaeological sites (Gilbert and Mielke, 1985; Grayson, 1984; Minnus, 1981). Analytical models developed in ecology, such as site catchment and optimal foraging theory, have been applied to archaeological problems (Keene, 1983). Statistical techniques developed by biologists, such as nearest-neighbour analysis and measures of diversity, are being applied to archaeological problems (Bobrowsky and Ball, n.d.; Whallon, 1974). More generally the theory of evolution has long been a mainstay of our thinking about human prehistory, and we are beginning to grapple explicitly with some of the consequences of heavy borrowing from another discipline. Keene (1983: 141–2) provides an elegant summary statement, noting that the "source of the problem is borrowing without modification and a tendency to adopt rather than to adapt."

One of the most famous examples of this problem is found in early applications of evolutionary theory to cultural change. The unilateral evolutionists believed that every society begins in savagery, changes to barbarism, and progresses to civilization. It was merely a matter of identifying the appropriate stage to characterize any particular society. Many years passed before anthropologists realized that the phylogenetic tree of biological evolution has its cultural counterpart in a phylogenetic trellis, the cross-pieces of which represent the capability of one culture to change or be changed by another. This simple modification made the borrowed theory much more useful and more faithful to the subject matter of archaeology.

This brief review has emphasized the contributions of biology to archaeology, but my title, "Archaeology as Palaeobiology," can be read to represent the other side of the coin, namely the contributions of archaeology to biology. Nearly all of Canada was covered by glacial ice during the late Pleistocene, and when the ice retreated the land was quickly colonized by people. A substantial majority of the vertebrate palaeobiological record of this country resides in its archaeological sites, and archaeologists have reserved for themselves, often with the force of law, the right to excavate and thereby to destroy these deposits. Therefore archaeologists must shoulder the responsibility for protecting and preserving palaeobiological resources that are as limited and as

non-renewable as archaeological resources. When an archaeologist excavates a site, its palaeobiological potential should play a prominent role in the selection of appropriate sampling technique and the subsequent curation of recovered materials.

The great archaeologist W.J. Wintemberg (1919; see also Gilmore, 1949) called attention to "Archaeology as an Aid to Zoology" in a paper published nearly 70 years ago, but our institutions are so organized that the aid is seldom fully realized. Many of our museums are devoted either to human history or to natural history; our universities teach archaeology and palaeobiology not merely in different departments but in different faculties; funds are obtained from different federal councils; and the Royal Society places these disciplines in different academies, a fact that stimulated the organization of the symposium on Science in Archaeology. I do not allege that archaeology and palaeobiology are one and the same or that they should be combined into a new superdiscipline. But it is undeniable that archaeologists and palaeobiologists interested in vertebrates must often depend on the same deposits. There has been little discussion of this fact because there has been litte attention paid to Holocene vertebrates except to serve archaeology. The attention of Quaternary vertebrate palaeontologists is strongly monopolized by Pleistocene faunas and the relatively rare finds of whole, articulated skeletons. Most Holocene palaeobiological studies have been concerned with pollen, plant macrofossils, and invertebrates that are relatively sensitive to climatic change. But the Holocene vertebrate record deserves study in its own right. It represents the baseline for understanding the massive changes that have accompanied European colonization, and recent work with stable isotopes and trace elements in bones shows promise for contributing to palaeoclimatic reconstructions and baseline data against which pollution can be measured.

The customary use of quarter-inch screens has kept many archaeologists blissfully unaware of the myriad microvertebrate and plant remains that languish in their back-dirt piles. It is often assumed that most or all items of cultural significance can be recovered in such screens and that smaller items are irrelevant or else would yield too little information to justify the cost of more intensive recovery techniques (but see Ball and Bobrowsky, 1987). I believe that archaeologists should employ intensive recovery techniques in all excavations that contain well-preserved palaeobiological materials, but they cannot always justify the time-consuming analysis of vertebrate remains that contribute little or nothing to an understanding of human subsistence. Such remains should be available to palaeobiologists either now or in the future, when archaeological deposits will become ever scarcer and permits to excavate them will become more difficult to obtain. By this means we can realize maximum benefit from these deposits and take full advantage of the contributions of archaeology to biology, and vice versa.

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Symposium: Canadian Editors and Diggers Abroad

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Clio in Cuneiform Costume: The Royal Inscriptions of Mesopotamia Project†

ANCIENT MESOPOTAMIA was the birthplace of one of the two most ancient civilizations in the history of the world. In the land between the rivers Tigris and Euphrates, the Sumerians created a culture which flourished between 3000 and 2000 B.C. and contributed to the history of civilization, among other things, the art of writing. The Assyrians and Babylonians who flourished from approximately 2000 to 500 B.C. were the cultural heirs of the Sumerians and continued the practice of writing in the cuneiform script.

The purpose of this paper is twofold, to examine the "historical" inscriptions from ancient Mesopotamia and to describe a modern research project, the Royal Inscriptions of Mesopotamia, which is publishing a major corpus of these documents. I shall begin with a survey of all Mesopotamian documents relevant to "history" in order to provide a context for a description of the research project. I shall conclude with a brief analysis of how Mesopotamians viewed events and the passage of time, what we call "history."

"HISTORICAL" TEXTS

The "historical" texts consist of three major types, called royal inscriptions, chronographic texts, and historical-literary texts.

The royal inscriptions were written by the ruler as a report to the god or gods that he had fulfilled his divine commission. This commission entailed ruling his subject peoples with justice and compassion and, in particular, undertaking major construction works such as the erection of temples and the dredging of

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irrigation canals. Consequently, the majority of royal inscriptions are inscribed to commemorate building projects. While they were always couched in terms of reporting these deeds to the god in a pious manner, the royal inscriptions developed very rapidly into boasts to contemporary and later peoples of the king's might.

The Sumerian and later Babylonian inscriptions continued to follow this original purpose and pattern. The Assyrian royal inscriptions, however, were eventually expanded to include records of military accomplishments of the Assyrian kings. This was a natural development given the imperialistic aims and achievements of these ancient monarchs.

Ancient Mesopotamian royal inscriptions were inscribed upon a variety of objects. Many were written on large stone slabs which decorated the walls of the palaces, and others were inscribed upon colossal stone bulls and lions erected in the entrances to these palaces. Yet others appeared on stone stelae. There were also inscribed clay tablets, prisms, and cylinders which were deposited in the foundations of ancient buildings. Royal inscriptions were written, as well, on a variety of ceremonial weapons and utensils made of precious stones and metals. Most abundant are the inscribed bricks used in the construction of palaces and temples.

The chronographic texts consist of chronicles and king lists, many of which were used in ancient times for chronological purposes. Indeed, these texts are a major aid to modern historians in reconstructing the chronology of ancient Mesopotamia and the ancient Near East in general. Among these chronographic texts is a series inscribed on clay tablets called the Babylonian Chronicles, which is particularly noteworthy and to which I shall return towards the end of this paper.

The third category of historical texts, the historical-literary inscriptions, is very diverse in nature. Within this general group are cycles of legends about ancient heroes, such as Sargon of Akkad. Another type of text is the "prophecies." These texts describe past events in prophetic terms—that is, as though they had not occurred yet—and also future events that the author predicts will take place. The "prophecies" are of special interest in the Late Period when Babylonia was conquered by the Persians and Greeks, as we shall see later.

THE ROYAL INSCRIPTIONS OF MESOPOTAMIA

Historians of any period need to have their sources in an authoritative edition which is readily accessible and understandable. While such sources are generally available for Western history back to Greek and Roman times, they are not available for historians of ancient Egypt and Mesopotamia. It was to correct this situation, at least in part, that the Royal Inscriptions of Mesopotamia Project was created. The purpose of the Project is to publish in authoritative editions, including English translations, all of the cuneiform

inscriptions of a particular genre, the royal inscriptions. This is the most extensive body of texts related to the history of ancient Mesopotamia and one which has had particular interest for both specialists and laymen since the decipherment of cuneiform.

These inscriptions, if they have been published at all, are available only in obscure monographs and periodicals published in numerous places, and many of these publications are out of print. The inscriptions themselves are scattered around the world: the major collections in modern museums are in the United States, Britain, France, East Germany, Turkey, and Iraq. Thus it has been necessary from the beginning of the Project to have an international editorial board with representative scholars from these countries as well as from Canada, where the Project has its headquarters.

The Project is supported by the Social Sciences and Humanities Research Council of Canada and the University of Toronto. Much of the research, all of the computer work, and all of the publication through the University of Toronto Press is done at the Project headquarters. We estimate that the Project will have published approximately 20 volumes by its end in the year 2001. As of May 1987, two volumes have been published and three further volumes are in an advanced stage of preparation.

CLIO IN CUNEIFORM COSTUME

I now return to the "historical" texts in general, to examine the ancient Mesopotamian view of events and the passage of time, or what we in the West call "history." The royal incriptions and the other historical texts briefly summarized in the first part of this paper tell us a great deal on this subject.

Ancient Mesopotamians were intensely conscious of, and interested in, their past. A good example is the last Babylonian king, Nabonidus (555–539 B.C.). He has been dubbed "the first archaeologist" because of his passion for discovering ancient inscriptions, when rebuilding Babylon, to learn about the city's past. His behaviour is typical, and thanks to the Mesopotamians' concern about the past, they produced a wealth of literature on this subject.

I referred above to the Babylonian Chronicles and promised to return to them. They are of particular interest on this matter because the scribes who wrote them simply reported year by year what they regarded as the major events. There is no attempt to emphasize a theme or prove an ideological theory. They represent, I think, an attempt to write "history for history's sake" at least two centuries before Herodotus, the so-called Father of History. I also mentioned the "prophecies." These are of special interest in the Late Period (fifth century B.C. and later) because some of them reflect the antagonistic attitude among the Babylonian intelligentsia towards their Persian and Greek conquerors. Not to put a fine point upon it, the Babylonians regarded the Greeks as barbarians. They were, in the Babylonian view, upstarts with no history or civilization. Some Babylonian scribes attempted to educate their foreign rulers,

but others, including the authors of the late prophecies, predicted their downfall.

In brief, three points can be made about the Mesopotamian view of events and the passage of time. First, past, present, and future were one continuous stream. There was a beginning some time back in hoary antiquity, concerning which there are many creation legends. But once time began, it continued without any end or repetition. There is no cyclical view of history in Mesopotamian writings, and, with the exception of some later writings, there is no view of an eschatological end to time. Second, the god and king were central to world events. This belief gave rise to the concept of the rise and fall of dynasties, which reappeared later in the world, for example in the Book of Daniel. Third, there is no word in any ancient Mesopotamian language for what we call "history." But neither is there a word for "literature," "theology," "science," "jurisprudence," etc. This is, of course, not to say that the ancient Mesopotamians were not interested in any of these subjects or that they did not write a great deal about them. Of course they did. What it does indicate is an entirely different view of knowledge and its categorization.

In this brief account I have attempted to give a sampling of the riches in store for those who look at ancient Mesopotamian historical documents. These voluminous writings, numbering in the thousands, are the product of a major civilization that flourished for over 2000 years before the Greeks and Romans came on the scene.

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JOHN WILLIAM WEVERS, F.R.S.C.*

Critical Editions of Canonical Texts: The Göttingen Septuaginta†

THE SEPTUAGINTA UNTERNEHMEN was established by the Akademie der Wissenschaften in Göttingen in 1908.[1] Critical editions of the Greek New Testament had been appearing throughout most of the nineteenth century but for the Septuagint no critical reconstruction of the text based on an assessment of manuscript collations had been made in modern times.

Of course the Septuagint was a translation document; it was not in the original language of Scripture, even though it was immediately accepted as itself canonical.[2] Nonetheless it was strange that the text of the Greek Old Testament should have largely escaped critical attention. But then textual criticism of the Old Testament had traditionally been a somewhat useless science. Collations of hundreds of medieval Hebrew manuscripts of the Bible had been made in the late eighteenth century by Kennicott and de Rossi,[3] but these had proved of little value, since practically all manuscript readings belonged to a single textual family, the Masoretic.

It is the sensational finds of Qumran near the Dead Sea some forty years ago which have clarified this situation. We had long known about the tight controls

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1 At the instigation of R. Smend and J. Wellhausen at a joint meeting of the Göttingen and Berlin Academies on 4 March, 1908. Initially it was supported jointly by the Prussian Academy of Sciences and the Göttingen Academy.

2 Cf. Aristeas, Letter to Philocrates, 308–10, where the synagogue in Alexandria is said to have placed its approval on the translation; by invoking a curse on anyone who might change the text in any way whether through addition or subtraction it was rendered canonical; compare Apoc 22:18f. At least these paragraphs sound authentic, even though the Aristeas account is otherwise pure fiction.

3 Benjamin Kennicott, ed. *Vetus Testamentum*, II Tom. (1776, 1780); Giovanni B. De Rossi, *Variae Lectiones Veteris Testamenti* (1784, 1788).

which the Masoretes of early medieval times had imposed on the text of the Old Testament; it was said that manuscripts were so carefully checked for error that even the letters of a book would be counted to make certain that no mistakes had crept into the copy.

The Dead Sea finds have shown us that it had not always been so. Dozens of Biblical manuscripts from the last two centuries B.C. are now extant and show texts quite different from the standard text we all knew. These texts had not been "fenced in" by the later restrictions. In fact only in the manuscripts from the last twenty years of Qumran, that is, after circa A.D. 50, are the texts monotonously the same as the medieval standard text. About A.D. 50 a new view of canonicity was emerging among the Rabbis. Not only was the Bible normative for faith and practice, but its form, the text in all its details was sacred as well; it was unalterable, and subsequent copies are thus all of a single text type.

But the Septuagint was made much earlier than that. About the middle of the third century B.C. Alexandrian Jews were losing their facility in Hebrew; a Greek version became necessary for synagogal worship. And so the books of the Torah, the five books of Moses, were translated into Greek. In due course the prophets and then the Writings as well were also translated. So the parent text of the Greek Old Testament represents an earlier textform than the standard Hebrew text; the Septuagint text is often at variance with the Hebrew, and is therefore an important tool for Old Testament textual criticism.

Now the textual history of the Greek translation was quite different from that of the Hebrew. Its exact form was never considered sacred, and changes both intentional and unintentional gradually came into the text.

In due course the rise of the Christian Church within Judaism and its eventual break with it during the first century of our era gave added importance to the Septuagint. Once the Christian Church had become largely Gentile it naturally used the Septuagint as its Bible, not only for its services of worship but also in its discussions and arguments with the Jews. Differences between the Hebrew and Greek texts were exaggerated, and by the second century the Jews were rejecting the Septuagint in favour of new revisions of the text, or even new translations, principally those of Aquila, Symmachus, and Theodotion. Meanwhile Christians too realized that there were differences between the Hebrew and the Septuagint texts. During the third and fourth centuries three official recensions of the text were made. According to Jerome, Origen revised the text for use in Palestine, Lucian of Antioch did so for Syria, and Hesychius for Egypt.

Only Origen's work is well known. He had studied some Hebrew for this purpose and then made his monumental (some would say monstrous) hexapla, a six-columned work in which the first column was the Hebrew text of his day, the second, the Hebrew in Greek transcription, the third and fourth, Aquila and Symmachus respectively, the fifth the Septuagint, and the sixth Theodotion. It is the fifth that claims our attention. Since it had to fit the Hebrew text of columns one and two, its word order was adapted to conform to the Hebrew.

Beyond this Origen used a simple quantitative yardstick. If the Greek text was longer, the extra text was marked with obelus and metobelus, signs borrowed from Aristarchus' edition of Homer. When the Greek did not have a corresponding text to some Hebrew he would borrow such from one of the Three, usually from Theodotion, and mark the beginning and end with asterisk and metobelus respectively.

This well-intentioned work created havoc for the text history of the Septuagint. The hexapla was far too huge to be copied out in full, and only the fifth column was used. Many copyists had no idea what those odd Aristarchean signs were all about, and reproduced them carelessly if at all. Unfortunately for the history of the Septuagint text Origen's work was popular, and few extant manuscripts have escaped its influence.

The Septuagint remained the canonical text for most parts of the Christian Church until the renaissance. Only then were the mysteries of Hebrew once again unlocked for Christian humanists—but that is another story. With the spread of Christianity beyond the Greek-speaking world it was this Greek Bible and not the Hebrew which was translated into Latin, Gothic, Ethiopic, Sahidic, Bohairic, Armenian, Syriac, Old Church Slavonic, and Arabic.

In contrast to the Masoretic text of the Hebrew Bible the Greek text had a rich and varied history. In fact, if one could somehow get back to the original text of the Septuagint or at least to a pre-Origen text we would have a marvelous tool for recovering a preMasoretic Hebrew text as well.

It was this challenge which the Septuaginta Unternehmen was created to meet. Alfred Rahlfs became its first director. Obviously photographs, and later on microfilm, of hundreds, if not thousands, of manuscripts would have to be collected. But before that could be done a catalogue of relevant materials, that is, of Bible manuscripts, catena manuscripts, lectionaries, and early patristic commentaries throughout the libraries, monasteries, and museums of the world, was a first priority. In 1915 as a Beiheft of the Academy there appeared Rahlfs' *Verzeichnis der griechischen Handschriften des Alten Testaments*, which remains to the present the *vade mecum* of every serious Septuagint scholar. Meanwhile Rahlfs organized a number of propadeutic textual studies which were published by the Academy, many in a series called *Mitteilungen des Septuaginta Unternehmens*. Initially the purchase of photographs centred on certain books for which no modern collation of materials existed. Collation books were created and the work of collating manuscripts for I Maccabees was begun. But this first *editio maior* was not to appear until 1937, two years after Rahlf's death. It was prepared by Rahlfs' successor, W. Kappler, and was based on a collation of twenty-nine manuscripts together with the Latin and Syriac versions.[4]

Current editors are three in number: Joseph Ziegler of Würzburg, the aged

4 I do not include Rahlfs' *Psalmi cum Odis* (1931), which is an *editio minor*. Rahlfs collated for it the uncial texts, the papyri, and only nine further cursives (out of almost a thousand listed in the *Verzeichnis*); catena manuscripts were not used, nor is there any note taken of the wealth of hexaplaric materials. An *editio maior* is intended by the Unternehmen in due course.

doyen of Septuagint studies whose first edition, Isaias, appeared in 1939, and his last, Hiob, in 1982; Robert Hanhart the Director of the Unternehmen; and myself. I was assigned to the Pentateuch in the mid-sixties.

The Pentateuch is particularly rich in extant manuscripts, exceeded in number only by the Psalter. For the Pentateuch there are over one hundred manuscripts. Every manuscript earlier than the sixteenth century[5] is painstakingly collated by specially trained part-time students and later reread by two senior collators. These collations are all recorded in collation books by the Göttingen collators. Only when these manuscripts are all collated, and the *Vorbemerkungen* or explanatory notes on difficult readings or problems of decipherment are added, does the editor receive these volumes.

The editor then collates all the papyri remains which for some books are quite extensive. For Genesis, I had twenty-nine papyri, of which three were extensive covering most of the book. On the other hand, for Leviticus, I had only eight pieces, all very fragmentary and none contributing much worthwhile information. Since papyri are often earlier than the manuscripts their evidence may be extremely valuable for determining an early form of the text. For Deuteronomy, I had extensive remains of a first century B.C. Fayyum document covering much of cc. 17–33.

Then the versions must be collated. The autographon of an early version would be as important as a contemporary Greek manuscript, but of course only later copies are extant. For example, the Ethiopic was probably translated from the Greek as early as the fourth century, but our oldest ms comes from the fourteenth century.

The most important as well as the most difficult version is the Vetus Latina. Unfortunately for the modern textual critic most literate Latin Fathers could also read Greek, and did. There never was an Authorized Version for the Vetus Latina, and the Fathers not only did not quote accurately but tended to revise or correct the text according to the Greek. Augustine, for example, used at least three different Old Latin texts as well as his own translations from the Greek. For the Pentateuch there are extensive manuscript remains as well as a wealth of patristic material. Fortunately the Vetus Latina Institut at the Benedictine monastery in Beuron has collected much of the patristic materials and a few weeks at the monastery is sufficient to gather the data. Jerome's Vulgata has created further difficulties for the Old Latin. His text was a translation from the Hebrew, and gradually supplanted the Old Latin; the critic must carefully distinguish between the two at all times.

I have already mentioned the Ethiopic, for which the evidence of seven manuscripts is used for the Pentateuch. Equally important are the Egyptian or Coptic texts. The Bohairic, the dialect of the delta region, is still used by the Coptic Church, and is therefore complete. My collations of the Bohairic are limited to the two oldest manuscripts. The Sahidic was the dialect of the South

5 Manuscripts after Gutenberg are not collated for obvious reasons.

and the translation is as old as the Bohairic. A number of copies have partially survived, some from as early as the sixth century. These translations were probably made in the third century. Other Coptic translations were also made; the Fayyumic and the Akhmimic survive only in small fragments.

The Old Armenian was translated in the fourth century; it is collated on the basis of the 1805 edition of Zohrabian. It is based on a few Venice manuscripts, none earlier than the thirteenth century, and is not overly satisfactory.

We also have some remains from an early Christian Aramaic version, sometimes called the Syropalestinian. Unfortunately only a few chapters or parts of chapters here and there are extant for the Pentateuchal books. These texts are all collected in an easily accessible volume as part of the Hebrew University Bible Project.

The most important witness to the hexaplaric text, that is, the fifth column of Origen's great work, is the Syrohexapla. This was translated under the supervision of Paul of Tella in the second decade of the seventh century. Most of it is extant for the Pentateuch now that the recently found Tur ᶜAbdin manuscript has been published in facsimile.[6] Its importance lies in its literalism. One knows exactly what the Greek parent text read. The last version collated is the Arabic, a rather unimportant late rendering of the hexaplaric text for the Melchite Church in Egypt.

Much less satisfactory is the collation of patristic evidence. Not only are most of the Fathers extant in uncritical editions, but the Fathers did not realize that twentieth-century scholars would be interested in the exact form of the text. They quote from memory, at times conflating two different texts into one, so that their evidence is often worthless. Furthermore these uncritical texts are usually without indices for Scripture passages, and one is reduced to turning through thousands of pages of Migne's *Patrologia* in search of citations of doubtful value.

When all the papyri, versions, and Greek Fathers have finally been collated and entered into the collation books, the real work can begin. The variant readings must be sorted out, their support classified into textual groups and families, and the readings evaluated. For the Pentateuch, eleven such text groups obtain, together with four subgroups. The textual history can then be used for reconstructing the critical text. Unfortunately the reverse is also true. Without a critical text there can hardly be a textual history of its development. An editor can only constantly play the one over against the other until gradually a clearer picture emerges.

Text criticism of the Septuagint has naturally much in common with that of the New Testament. Many of its rules of thumb, such as preference (that is, when all things are equal, which they seldom are) for the *lectio difficilior* or for the *lectio brevior*, are shared. But the Septuagint has one dimension that the

6 Except for Leviticus and part of Genesis it is also extant in a Paris manuscript published by P. de Lagarde, *Bibliotheca Syriaca* (1892).

New Testament does not have; it is a translation document. Each book must be separately examined for its translation form, for the attitude of the translator towards his task, for his patterns of usage—Does he tend towards the demands of the target language or of the source language? That is, is the translation good Greek or is it quite Hebraic?

And finally the editor must be aware of the kind of literary Greek used in the time of the translator, that is, for the Pentateuch, third-century B.C. usage in Alexandria.

In due course a critical text is created, ideally one as close to the original text as one can possibly come. The apparatus constitutes a digest of its text history. The necessary introduction is written, learned appendices added, and the edition as well as a separate monograph on the textual history are sent in to the Unternehmen to be readied for publication.

The Göttingen Septuagint is a good example of international scholarship and co-operation.[7] The Unternehmen operates under annual grants from the Academy, which in turn is sustained by the government of Lower Saxony. The editions themselves are made possible through heavy subventions from the federal government in Bonn. And my own involvement has been regularly encouraged by more than twenty years of travel and subsistence grants from the Social Sciences and Humanities Research Council of Canada and its predecessor the Canada Council.

7 This is particularly exemplified by the generous appointment by the Director of the Unternehmen of Udo Quast as editorial assistant for my Pentateuch volumes, and of Detlef Fraenkel as expert assistant on hexaplaric materials. My work would be quite unthinkable without these two experts, both of whom are not only professional in Septuagint matters but are also devoted aides; I owe much to them.

R.J. BUCK* AND A.M. SMALL*

The Roman Villa at San Giovanni†

A CANADIAN TEAM from the University of Alberta, with other participants from the University of Waterloo, Sir Wilfrid Laurier University, and several other Canadian and British universities, excavated the site of San Giovanni de Ruoti in the province of Basilicata in southern Italy between the years 1977 and 1984. The funding came principally from the Social Sciences and Humanities Research Council of Canada, to whom we express our gratitude. San Giovanni lies about 27 km. west of the provincial capital of Potenza and about 2 km. north of the village of Ruoti, facing south over a steep river valley. It is in the northern part of the ancient Italian district of Lucania, not too far from the Ofanto river, the boundary with Samnium.

The site was first subjected to a magnetometric survey to suggest where the most promising locations to dig might be. At the recommendation of the late Dr. Linington of the Fondazione Lerici we concentrated on the western part, since the eastern seemed shallow and probably not as satisfactory stratigraphically. Trial soundings in later seasons confirmed Dr. Linington's assessment. The excavated area eventually covered an area some 75 m. east-west by about 50 m. north-south. After several seasons the western part of this excavated sector was reserved for the student classes to work on, with the workmen deployed on the eastern and northern parts. The excavations revealed several superimposed structures, all much rebuilt and belonging to a series of villas.

All these we were able to divide on the basis of the stratigraphy into three chronologically distinct periods termed Periods 1, 2, and 3. Periods 2 and 3 were further sub-divided into 2A, 2B, and 2C, 3A, 3B early, and 3B late. That

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is, Villa 2 went through three extensive alterations, Villa 3 through two, with the last somewhat altered before the end. There were then seven rather distinct stages that could be identified and dated, running from A.D. 1 to 550. There were ceramic remains of a still earlier date, as early as 200 B.C., but the associated structures have not been found.

The first period need not concern us very much. It seems to have been an Italian villa of a familiar type, of which scores have been excavated in Italy. It had a kiln and tile works, but its only interest here is that, although it was occupied from A.D. 1 to 200, we are forced to conclude from the almost total absence of destruction debris that it remained in being and in some sort of repair for the next 150 years to A.D. 350, all this time unoccupied. It was finally modified at the beginning of Period 2. We can only guess why it remained in repair but uninhabited. Perhaps the landlord or his staff lived in some nearby fortified town and commuted out for work on the land, using the villa as a shelter in inclement weather.

Some time around 350 the villa buildings were reoccupied, in what we term Period 2, which lasted until about 400. In these fifty years there seem to have been almost continuous alterations. First there was a series of repairs and patchings to render the place more habitable, in Period 2A, dated 350–60. Next there was a major rebuilding with a bath suite being added on the west side, in Period 2B, dated 360–80. Then there was a massive tearing down and reconstruction on the eastern side, with a whole new wing being erected, in Period 2C, dated 380–400. For some reason all that had been done failed to be what was required, and everything except the most recent buildings were demolished around 400.

Period 3 is the one of greatest interest to us; Period 3A runs from about A.D. 400 to 460, and Period 3B from 460 to about 550. It is unique as the only non-ecclesiastical structure of this date so far found and identified in south Italy; there are, of course, several others contemporary that have been discovered in other parts of the Empire, notably along the Dalmatian coast.

Period 3A saw a large sprawling set of buildings erected slightly to the south and to the east of the Period 2 structures along the slope and looking over the valley. There were four parts strung along the contour line. The westernmost wing was a large apsidal building incorporating the buildings put up in Period 2C. Next to the east and facing on a long, narrow terrace was a central wing with an upper storey and an overhanging porch. At the east end came the third part, a two-room adjoining building containing a cistern; there was a stair on the east side leading to an upper storey facing east. Finally to the southeast lay a large and impressive bath suite, with a large entry room with fountains, a commodious latrine (added during Period 3A), the necessary hot room, furnaces, bath, cold plunge, and changing room (*apodyterium*). This is very different from the smaller and simpler bath of Period 2. The bath is linked to a large drain along its east side, one that started somewhere north of the bath suite but was partially demolished by the buildings of Period 3B.

The west wing clearly contained a large, basilica-like apsidal hall, but in the absence of remains in the area (for there has been much erosion and there was a careful reusing of material from this wing elsewhere in Period 3B) it is uncertain what its precise functions were. We surmise that it was for formal occasions, such as receiving visitors, tenants, and the like: that is, it was a *praetorium*, to use the word in the Late Roman sense.

Garbage was disposed of uphill to the northwest of the new villa, over the remains of some of the rooms of Periods 1 and 2, in a large pile, what we term a "midden." Smaller amounts were dumped over the edge of the terrace. Although manure piles and garbage dumps were regarded as an asset in Roman agriculture as a source of valuable fertilizer, they were normally not quite as close to the residential part of the villa; and the tenants of San Giovanni seem never to have used this midden at all. Consequently we are led to ask what sort of tenants were occupying San Giovanni after 400. It is worth remembering that the *Notitia Dignitatum* indicates that there was a fairly substantial settlement of mercenary veterans in the area of Lucania.

At some point around 460 an earthquake or landslide damaged the villa, particularly the bath suite and the *praetorium*, cracking the foundations along an east-west fault line. Extensive repairs were made to the foundations of the bath suite, and new buttresses were installed for further reinforcement; but the damage to the foundations of the west wing was extensive, with part of the apse moved about 40 cm. downhill. A decision was made to abandon the *praetorium* and apparently to re-use the materials at a new location uphill and to the rear of the central section. A new building programme was undertaken, the one that produced Period 3B.

The north wall of the old west wing was left standing as a retaining wall; the rooms built in Period 2C plus the eastern corner of the old west wing were also kept, the latter for some sort of porter's lodge. One of the old Period 2 rooms was extensively altered to produce a domed or vaulted chamber of two doors with a circular-shaped interior with niches in the corners. It apparently acted as a ceremonial entrance to the west side of the villa. One of the rooms in the southwest contained a press. Since San Giovanni is rather high for oliviculture, we conjecture that it was used rather for wine. To the north of the new entry and abutting on it two new rooms were erected, abutting in turn on to a new *praetorium* and closing off the western side of the villa. They were apparently one-storey stables and their foundations were dug right into the midden piles of Period 3A.

The most impressive feature of the new building programme was the erection of a huge structure of two stories, some 30 m. long by 15 m. wide, that lay north of the central section of the Period 3A buildings. It is complex, since it contained the *praetorium*, its antechambers, another suite, various ground-level storage rooms, an elaborate entry, and a large tower, and it is constructed on a fairly steep slope from north to south. In the western part the ground-floor rooms were simply cellars, undercrofts for storage, and entered by a doorway in

the apse. Above these cellars was the main floor, the *praetorium*, with its two antechambers. These were entered from the north by a stairwell which was protected at the ground level by a porch, the footings for its columns having been found *in situ*. Thus the *praetorium* could be entered from the north by way of a porch. Persons entering the *praetorium* did not have to enter the rest of the villa at all, and the domed ceremonial entrance chamber could be kept for other and no doubt more personal guests.

To the east of the porch were the foundations of a tower. This was of irregular shape because of the presence of a previously constructed aqueduct. To the east of the *praetorium* and its antechambers was a self-contained suite of rooms at the ground level of the south side, that is, much lower than the main floor of the *praetorium*. There were two small rooms next to cellars under the antechambers of the *praetorium* (there was no door between these rooms and the cellars) both linked to one another and to the third room of the suite, a long and narrow chamber. This originally had been floored on a slight slope, as the dressing of the walls makes clear, but about 500 (probably when the tower was built) a new mosaic floor was installed, level and somewhat lower than the previous floor. The mosaic is in three panels of geometric designs, and it is of pretty good workmanship. Again, its presence in a remote part of Italy around 500 gives pause for more consideration of the level of culture at this time in such places as these.

The elaborate mosaic, the presence of a setting for a washstand, and the existence of a set of drains have led us to conclude that the two rooms form a kitchen unit and the long, narrow room is a dining room. The room is, however, not wide enough for reclining but seems rather more convenient for sitting at table. Whether this means informal family dining by a Roman *dominus* or whether we have here a change of table manners of the type to be associated with a change of population, as to a non-Roman stock like the Goths, we are not certain.

The *praetorium* was lit by windows with stone mullions or piers supporting fairly elaborate impost blocks with vestigial Ionian decoration of a type readily paralleled in Dalmatia. Examples of these were found below the walls along with much glass that John Hayes describes as of rather poor quality. There were two sizes of mullions or piers and blocks, indicating two sizes of windows, as in the churches roughly contemporary in Ravenna. The building was tile-roofed, probably with a central ridge running east-west. The architectural peculiarities have led us to conclude that the dining suite had its own shed roof over its single storey, a roof that drained into a long narrow open channel in the aqueduct immediately to the east.

Between this complex and the old central section were, first, a light well and drainage area just to the south of the *praetorium*, then a large shed-like building. This building was flanked on the east by a set of rooms, and there was probably an upper passageway linking to the buildings of Period 3A.

The old central section was altered during Period 3B. The lower rooms were

redesigned as stables with mangers and *opus signinum* floors, and an elaborate drainage system. The upper rooms presumably were residential, to judge by the remains that were recovered from the debris: combs, hairpins, statuettes, lamps, etc.

The bath suite was also altered during Period 3B. A new hot room was added, a former *frigidarium* was given a mosaic floor, and still another mosaic floor was laid in a former *tepidarium*. New hot rooms and another furnace were added, and late in the phase new buttresses were inserted.

The water for the baths was supplied by the aqueduct that ran along the east wall and necessitated the irregular plan of the tower at the northeast corner. This aqueduct probably ran northwest for half a kilometre to some nearby springs. The flow was augmented by the catchment of roof water below the dining room and ran into a brick structure that we conjecture is the remains of the *castellum aquae*, or distribution chamber, from where it was led in lead pipes to the baths and to the fountain in the anteroom of the baths. A drain took off the surplus water from the *castellum aquae* to join one built in Period 3A. Another drain from the anteroom of the bath suite flushed the latrine and debouched below some new rooms that were erected late in Period 3A.

After 520 or so the villa seems to have gone into a decline. No more fine wares appear, but only local coarse wares, notably the Late Painted Coarse Ware, as we term it, and so the chronology becomes difficult. In the central section several of the rooms were no longer used as stables, but the mangers were removed, and they became workrooms or storage chambers, to judge by the presence of many augers, chisels, drills, etc., in the destruction debris. The long east-west corridor had a trough erected in it, while some of the rooms in the old west wing were unroofed and used as dumps for midden material. Clearly the inhabitants of the villa were having trouble maintaining the place, and it seems likely that there was a decline in the population of the site, if not in the activities that produced all the midden, in the second quarter of the sixth century. The latest datable find is a Lombard-style bronze belt buckle, credited to the third quarter of the sixth century.

Finally the *praetorium* was burnt and collapsed, while the rest of the villa remained desolate and gradually decayed into ruin. We suspect that this burning and depopulation of the site was an incident in the Gothic Wars. There was heavy fighting in Lucania in the late 540s and again in the 550s. In one of these campaigns San Giovanni could have been finally ruined and left to rot.

The villa of Period 3 poses several problems. The closest congeners for the architectural pieces, like the impost blocks and the frustum-shaped tiles, as well as for the layout and the style of the mosaics, lie not so much with Rome or in Campania but rather with Ravenna and the great villas of the Dalmatian coast. This sort of link speaks for close cultural connections between the Adriatic area and Lucania.

The villa of San Giovanni does not appear to be unique in Lucania. Several other large (though unexcavated) sites are datable to the fourth and fifth

centuries. These support the idea that there was a considerable growth of rural settlement and no doubt of rural population in Lucania in this period.

No more than about three dozen coins were recovered from all three periods of the site, with nothing much later than about A.D. 350. This finding was not very surprising: the villa of Period 1 did not seem to be of other than a rustic nature; by Periods 2 and 3 barter and payment in kind had largely replaced coinage for most commercial transactions and for the payment of taxes. A place like San Giovanni would not require much currency in such circumstances.

The middens, all of Period 3, occupy old rooms, disroofed areas, and are scattered in heaps and piles throughout the site. There are nine different ones, five from Period 3B. Their contents have been classified and analysed, and much of our evidence for stratigraphy and chronology is derived from the mass of ceramic material they contained.

In addition to pottery and other small finds we also recovered from the middens several tons of animal bones. These are currently being investigated by Dr. Gentry Steele, now of Texas A. & M., and Ms. Cristi Assad. There are bones from pigs, cows, sheep, goats, horses, deer, dogs, cats, rats, mice, chickens and other birds, and two human foetuses. From preliminary examinations it is clear that the vast majority of the bones, some 80 to 85 per cent, are from hogs. The bones often show marks as if meat had been sliced away. It seems that the site was a centre of sausage or meat production.

Lucania was famous in antiquity for the high quality and popularity of its sausages, which were widely esteemed and eaten. To this day the Greek word for sausage is the same word that was used in Latin and in Koiné Greek, "the Lucanian thing," *Loukanikon*. Diocletian's Edict on Prices is very careful to list and price several different varieties of Lucanian sausage, which were a principal item of export from Lucania for centuries.

The similarities that were noted above with other areas of the Adriatic region speak for associations with Ravenna. Ravenna received foodstuffs as taxes, too, as Cassiodorus makes clear. It needed extensive food supplies, and as a seaport it could easily draw them from anywhere within convenient reach of the Adriatic. Ravenna may well have obtained supplies from Lucania.

The Via Herculia on the south reached the Gulf of Taranto near Heraclea (modern Policoro), a well-known harbour in mediaeval times; northwards it links with the Via Traiana at Venusia, which in turn leads to the Adriatic near Barletta. Neither of these is a difficult route.

The middens also produced a rich haul of plant material. There were seeds of wheat, oats, barley, the grape, and the olive; there were acorns, chestnuts, and pinecones; various wild grasses and hays. The only surprise was the presence of oats, domesticated not wild. The implications of this we are still assessing. The acidity of the soil made it impossible to recover any pollen.

There are also in the later middens, in which *no* African Red Slip or other African wares appear, several fragments of Phocaean Red Ware and of other

Aegean and Greek wares. These are an indication of some developing links with the Eastern regions beyond the Adriatic. With the Vandal seizure and isolation of Africa in the middle of the fifth century the trade between it and Italy was interrupted for several decades, and something else was replacing the former connections with Africa.

It is clear that the picture in south Italy emerging from the excavations at San Giovanni and from the surveys is at variance with many of the currently accepted notions of what was happening at the time of the "decline and fall" of the western Roman Empire.

JAMES RUSSELL*

Excavation and Restoration at Roman Anemurium (Turkey)†

THE SITE OF ANEMURIUM occupies the eastern flank of Cape Anamur, the southernmost point of Asia Minor, immediately opposite Cyprus. Here lie the remains of a modest Roman city, the largest of several located on the line of the ancient road that traverses the coast of Rough Cilicia, as this region was called in antiquity because of its rugged character.

Already in existence in the fourth century B.C., the city, like so many others of the eastern Roman Empire, reached its greatest prosperity during the second and early third centuries of our era. After a long period of instability precipitated by a brief occupation by the Persians of Shapur I around A.D. 260, the city's fortunes revived somewhat during the fifth century when it seems to have expanded to its largest size. By the end of the following century, however, a marked decline had set in, aggravated by the unsettled conditions that prevailed in the region during the following decades. By the year 700 what was left of Anemurium had ceased to exist, victim no doubt of the ever-increasing harassment of the Cilician shore by Arab raiders in the years after the first Ummayid invasion of Cyprus in 649. After a prolonged period of abandonment part of the site was reoccupied sometime after 1000 and the promontory fortified as a stronghold of the Knights of Little Armenia. Under the Seljuks of Rum, who captured the region in the first quarter of the thirteenth century, the citadel of Anemurium was deserted in favour of the splendid Mamuriye Castle at the eastern end of the Anamur Plain. With the exception of a few small cottages, the site has remained virtually uninhabited since the Middle Ages. The cumulative effect of over a millennium of occupation on the site, however,

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† Presented to the symposium, "Canadian Editors and Diggers Abroad," McMaster University, 2 June, 1987.

PLATE 1. Anemurium: general view of the site looking north with large public buildings in foreground.

has resulted in a field of ruins extending north from the citadel along the shore for over 1,500 metres and about 400 metres westward from the sea to embrace the lower slopes of the ridge (Plate 1). Many of the remains survive in a remarkable state of preservation, though partly buried beneath an accumulated mass of fill washed down the hillside over the intervening centuries.

During the nineteenth century the site was visited and briefly described by several travellers, most notably by Captain Francis Beaufort, whose description of his visit in 1809 long remained the most valuable.[1] It was not until the early 1960s, however, that the first detailed study of the ruins was conducted, under the leadership of Elisabeth Alföldi-Rosenbaum of the University of Toronto.[2] This led to a programme of excavation, consolidation, and restoration that began under her direction in 1965 and has continued on a more ambitious scale from 1971 to the present under my direction. The work, sponsored by the University of British Columbia, has enjoyed since 1969 the

1 F. Beaufort, *Karamania* (London, 1817), 187–98.
2 The results of the initial survey are summarized in E. Rosenbaum, G. Huber, and S. Onurkan, *A Survey of Coastal Cities in Western Cilicia* (Ankara, 1967), 1–27.

continuous and generous support of the Canada Council and of its successor, the Social Sciences and Humanities Research Council of Canada, as its principal source of funding.[3]

The significance of our work at Anemurium lies in the detailed picture of a medium-sized market-centre in a relatively remote corner of Asia Minor over ten centuries. In the modest role it assumed in the economy of its region, Anemurium provides a far more accurate measure of provincial urbanization in both the Roman and Byzantine empires than do larger cosmopolitan centres of the region such as Ephesus or Antioch. In contrast to them, however, cities such as Anemurium are poorly documented in the literary sources. Consequently, archaeological, epigraphic, and other related evidence acquires a proportionately greater importance in establishing the city's history. The scope of our investigation will become apparent if I illustrate representative examples from each aspect of our work.

Of particular interest from the outset of the excavation was the nucleus of well-preserved public buildings which formed the city centre at the height of its prosperity in the second and third centuries after Christ (Figure 1). These include a large theatre, a small odeon or small theatre that probably served as the city's council chamber, a spacious three-aisled civil basilica or town hall dominated by an apsed tribunal, and three large public baths. Most of these buildings have been cleared of surface debris, surveyed, and in some cases consolidated and partially reconstructed to render them structurally safe. The largest of the baths provides a striking illustration of how the pretensions of the age infected even the most insignificant municipalities of the empire. The entire complex, laid out on an artificial terrace, includes the baths themselves and an exercise yard or palaestra, forming a single unit measuring close to 100 metres in length (Figure 2). The palaestra, an open square enclosed on three sides by colonnaded porticoes, alone covered an area of over 1,000 square metres, its entire surface once covered in mosaic of varying geometric patterns. Here citizens would exercise or socialize before passing through a court paved in limestone slabs to the central hall. This hall formed the main entrance to the baths and was especially designed to dramatize its central location after the fashion of the ceremonial marble halls of the great imperial baths of cities such as Ephesus and Sardis. A more intimate touch is supplied in an inscribed panel in Greek at the entrance encouraging the visitor to "have a good bath." A matching panel with the legend "You've had a good bath" met the bather upon

3 For a summary of the city's history and antiquities on the basis of subsequent fieldwork, see J. Russell, "Anemurium—eine römische Kleinstadt in Kleinasien," *Antike Welt*, 7:4 (1976), 2–20; *idem*, "Anemurium: The Changing Face of a Roman City," *Archaeology*, 33:5 (1980), 31–40. Preliminary reports of excavations have been published regularly since 1966 in *Türk Arkeoloji Dergisi*, since 1974 in *Classical Views*, and in abbreviated form in "Recent Archaeological Research in Turkey," *Anatolian Studies*, and in M.J. Mellink, "Archaeology in Asia Minor," in *American Journal of Archaeology*.

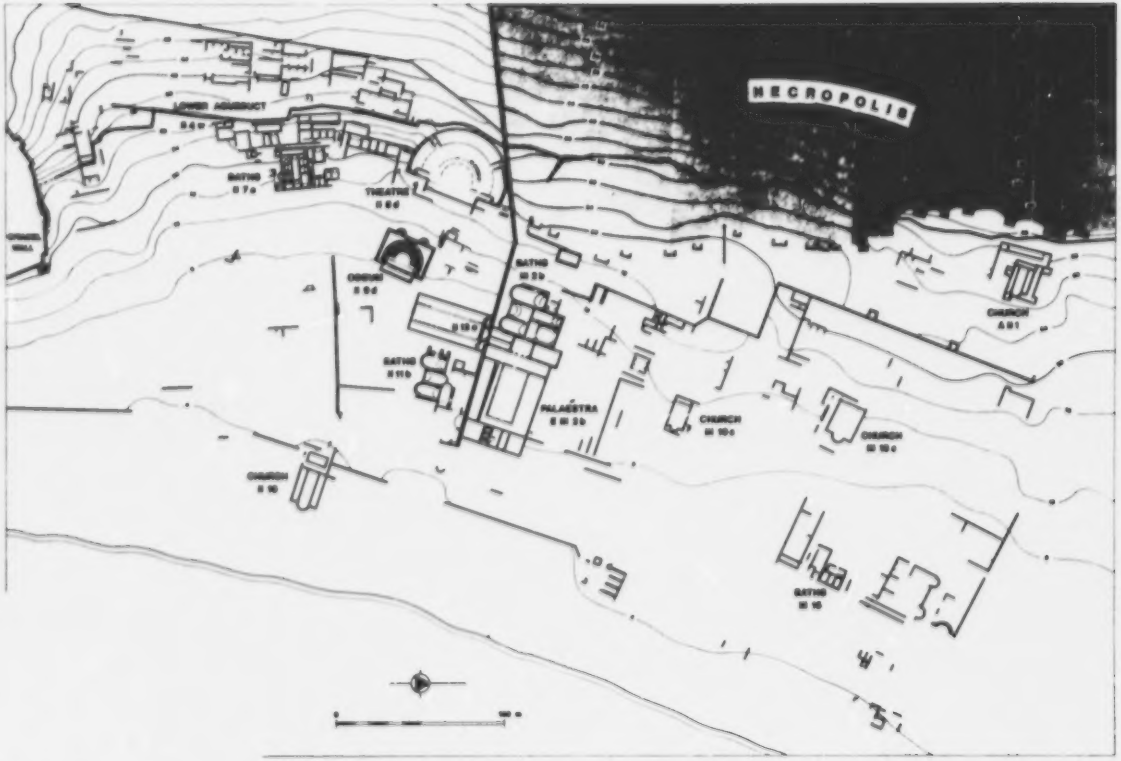

FIGURE 1. Anemurium, general plan of the ancient site.

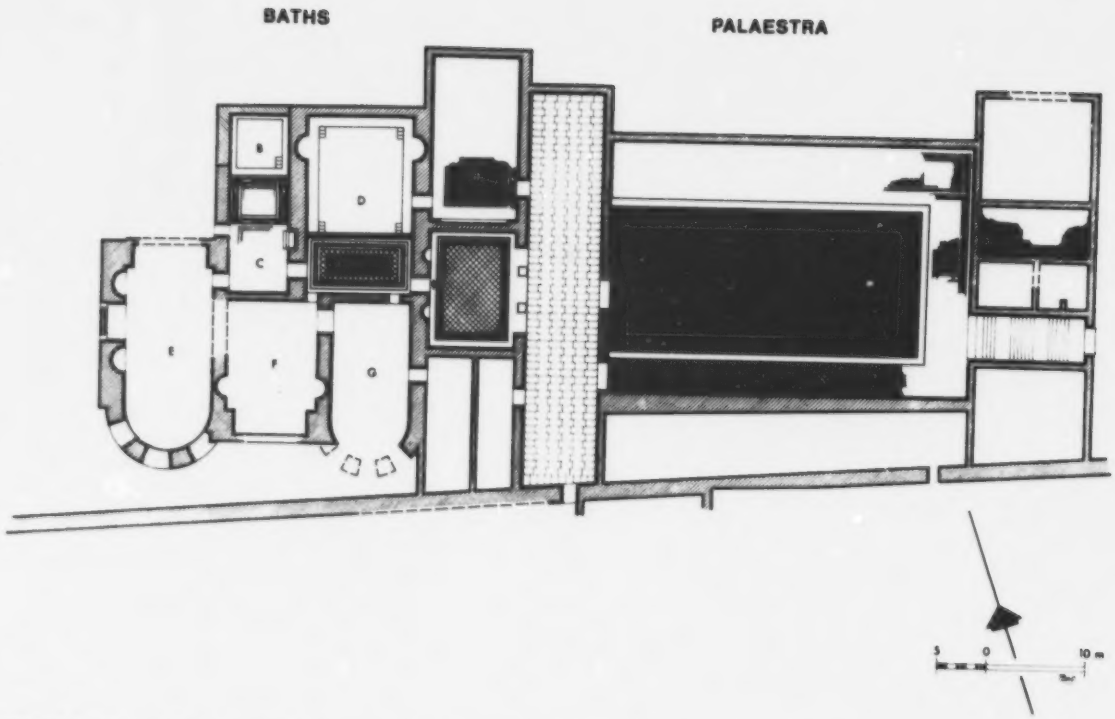

FIGURE 2. Plan of the large Roman baths and mosaic-paved palaestra (exercise-yard).

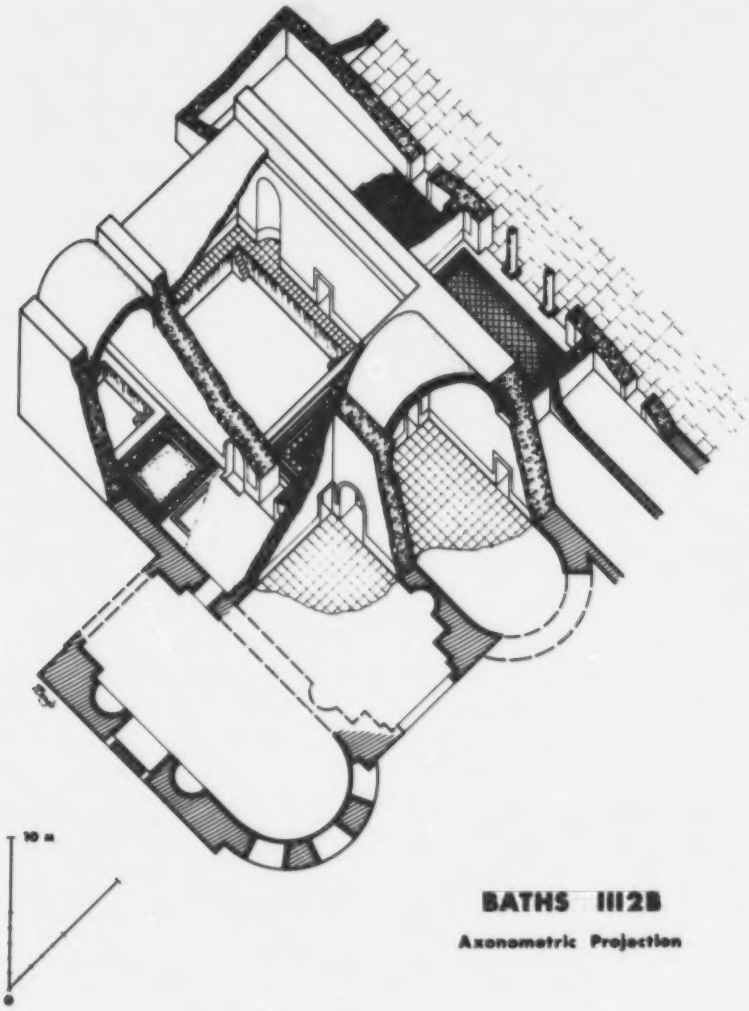

FIGURE 3. Isometric drawing of the large Roman baths looking northeast.

re-entering the palaestra after his ablutions.[4] The bath building proper now stands roofless, but its plan is perfectly intelligible: two cold rooms situated on the north and three parallel heated chambers on the south (Figure 3). The latter were heated by a hypocaust system in which heat passed from a furnace at one end of the room through a hollow space beneath the floor, which was suspended on rows of brick piers. Each of the unheated rooms contained a cold-water plunge, while commodious hot water tanks were placed in the various niches of the hot rooms (Plate 2).

A measure of elegance was also enjoyed by many of the citizens of this period in their private lives. Their actual homes are poorly preserved, but mosaic floors discovered throughout the city afford a glimpse of their former quality. One residence, for example, could boast not only an interesting selection of geometric designs but also figured scenes depicting the Three Graces, a Winged Victory, markedly provincial in character, two busts of Hermes, identified here as the god of merchants, and a sea-goddess, perhaps Thetis, surrounded by a miscellaneous company of sea-creatures (Plate 3).

The best reflection of private taste during the High Empire at Anemurium, however, is to be found in the necropolis, one of the finest surviving anywhere in the Roman Empire. This cemetery numbers some 350 individual surviving tombs, dating variously from the first to the early fourth century after Christ, and ranging in type from simple barrel-vaulted chambers to complex two-storey structures.[5] Their interiors, especially the anterooms that provided the setting for family rituals in honour of the deceased, were normally decorated in painted plaster and mosaic. In several instances the paintings are well preserved and depict scenes of considerable importance in the history of Roman art. The condition of the wall surface, however, frequently obscures the details, and one of our operations has been devoted to the cleaning and conservation of the best-preserved paintings and the consolidation of the outer structure of the tombs that house them.[6] Our most impressive results have been achieved in the entrance passage of a complex tomb, where substantial parts of the painted decoration have survived.[7] The contrast between the condition of the paintings before and after cleaning as illustrated in the bust of Winter in a wreath medallion and the representation of Summer as a winged putto demonstrates the effectiveness of our cleaning methods (Plate 4). The process is a delicate one involving the application of mild acid solutions to soften the surface accretions, which are then pared away by means of scalpels. The patient

4 For detailed discussion of these texts, J. Russell, *The Mosaic Inscriptions of Anemurium* (Ergänzungsbände zu den Tituli Asiae Minoris 13: Österreichische Akad. der Wissenschaften, Phil.-Hist. Kl. Denkschriften, 190) (Vienna, 1987), 28–34.

5 For a general description, see E. Alföldi-Rosenbaum, *Anamur Necropolu: the Necropolis of Anemurium* (Ankara, 1971).

6 J. Russell, "Restoration, Conservation and Excavation at the Necropolis of Anemurium, Turkey, 1974–75," *Journal of Field Archaeology*, 4 (1977), 45–62.

7 J. Russell, "Funerary Scenes from Roman Anemurium," *Yayla*, 5 (1984), 16–24.

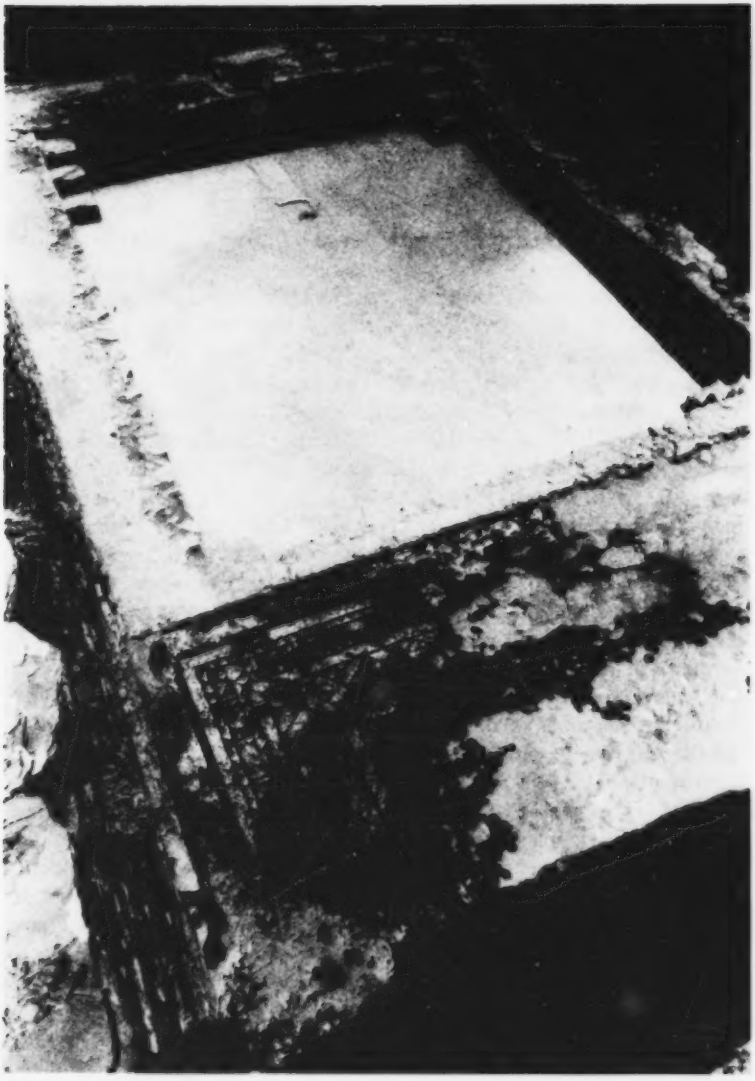

PLATE 2. Cold room with plunge in large Roman baths in Anemurium.

PLATE 3. Mosaic pavement discovered in a Roman house, depicting a sea-goddess, perhaps Thetis, surrounded by fish.

work of cleaning has also exposed in the same chamber an interesting scene previously invisible beneath blackened layers of salts and organic growths. In it Hermes Psychopompos, the Conductor of Souls, is preceded by Pothos, depicted as a putto personifying the sad yearning of the bereaved (Figure 4). Both figures turn back with a gesture of encouragement to a third figure now lost in the space to the left where the plaster has disappeared. From the final two letters (XH) that survive of the inscription, we can almost certainly identify this figure as Psyche, the soul of the deceased, whose personified presence appears in tombs from other parts of the Roman world.

In recent years we have directed much of our effort to the city's later phases, especially the fifth and early sixth centuries, when it again enjoyed a modicum of prosperity. The most distinctive feature of Anemurium at this time was its Christianity. Documentary evidence gives us some information on the city's role in the ecclesiastical politics of the day, but the most striking evidence of the Church's strength in fifth-century Anemurium lies in the material remains of Christian buildings that survive in different quarters of the city and in the countryside around.[8] All of the city's four churches have been investigated to some extent, but only one, the Necropolis Church, has been excavated in its entirety (Plate 5, Figure 5). Though it underwent considerable enlargement in

8 For a brief account of Christianity at Anemurium, see J. Russell, "Christianity at Anemurium in the Early Byzantine Period," *Actes du XIème Congrès International d'Archéologie Chrétienne, Lyon, Grenoble, Genève, Aosta, 21–28 Sept. 1986* (Rome, forthcoming).

PLATE 4. Painted plaster decoration of a third-century tomb at Anemurium depicting the Seasons, Winter in a wreathed roundel and Summer in a rectangular frame (right).

FIGURE 4. Drawing of painted decoration of Hermes Psychopompos and Pothos from third-century Roman tomb.

PLATE 5. View of the Necropolis Church at Anemurium after excavation, looking east.

the course of its complex building history, the church retained as its core the simple basilical plan of the original structure, dated around A.D. 400. The addition of an extra aisle or corridor along the north flank was probably intended as a *catechumenon* to enable novices to participate in the service. When ready for full communion they would proceed into a small baptistery at the east end of this corridor and from there newly baptized they would pass into the church proper. A much more impressive baptistery came to light in the *pastophorion* or service room at the east end of the south aisle of the largest of the city's churches, believed to be the cathedral church (Plate 6). This had a cruciform basin covered by a vaulted canopy supported by four columns at the corners. Copious fragments of glass tesserae found amongst the collapsed debris attest to the rich decoration that once embellished the inner surface of the canopy, perhaps in the form of saints.[9]

Quite the most striking feature that remains of the churches at Anemurium are the polychrome mosaic floors that decorated their interiors. While they exhibit a broad range of colour and motif, there is also enough uniformity of style to suggest that a common master or atelier executed much of the work within a relatively short period of time. Motifs were largely geometric, though in two churches figures of animals or birds, either individually or in pairs, are represented within circular or oval guilloche frames respectively (Plate 7). There is much to be learned too from the inscribed panels recording individual

9 For details, see J. Russell, "Excavations at Anemurium (Eski Anamur) 1982," *Classical Views*, n.s. 2 (1983), 177–8.

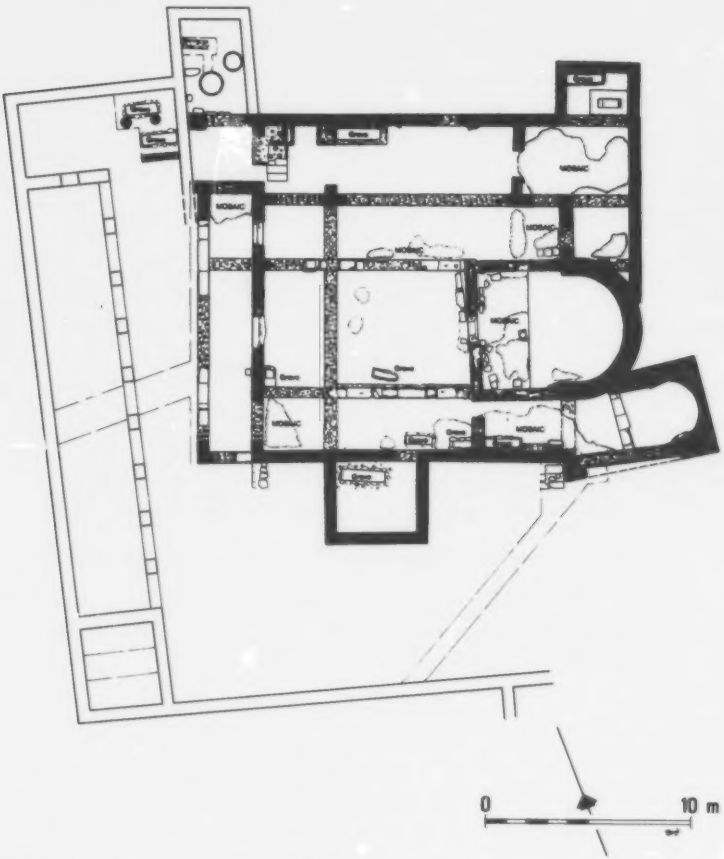

FIGURE 5. Plan of the Necropolis Church.

benefactions either by name, or anonymously in the case of one text couched in a series of liturgical formulae framed by the outline of a chalice.[10] Another text records the relaying of the mosaic floor in a church narthex by a confraternity of devout laymen, an institution well attested in large cities such as Constantinople, Antioch, or Alexandria, but rarely found in small centres.[11] Perhaps the most interesting mosaic appeared in the sanctuary of the Necropolis Church where the original floor with its geometric decoration and inscribed panels recording benefactions was covered by a figured scene depicting a leopard and a kid confronting one another (Figure 6). The accompanying text, a quotation

10 Russell, *The Mosaic Inscriptions*, 53–60.
11 *Ibid.*, 61–6.

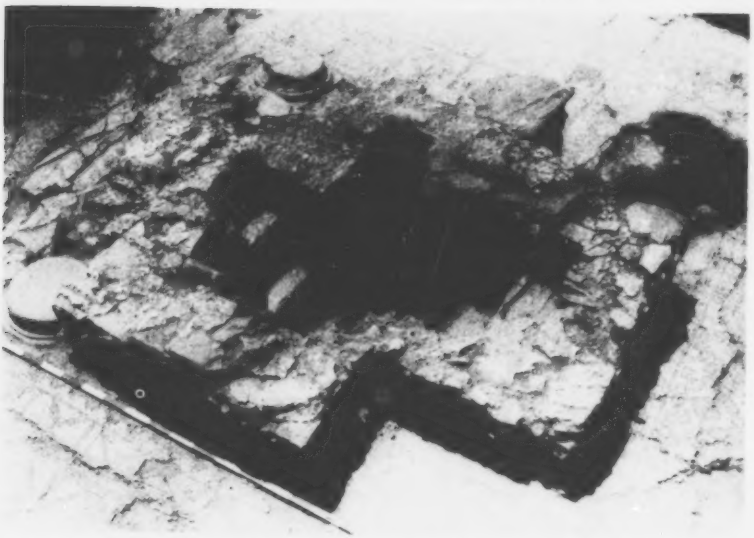

PLATE 6. Cruciform baptistery of the Church III 13 C, perhaps the cathedral church.

PLATE 7. Mosaic pavement of nave of Church III 13 C with figure of wild dog in oval guilloche.

FIGURE 6. Drawing of upper level of mosaic floor of sanctuary of the Necropolis Church, depicting the Peaceful Kingdom of Isaiah.

from the Septuagint (Isaiah 11.6), "And a little child will lead them and leopard will lie down with kid," identifies the scene as part of the Peaceful Kingdom of Isaiah in which we may conjecture a second pair of animals, ox and lion perhaps, in the missing portion on the left.[12]

Another subject that has engaged our attention concerns the city's decline. This seems to have set in well before the end of the sixth century, perhaps precipitated by an earthquake around 580, causing havoc so widespread that it proved beyond the community's means to repair. Yet despite this disaster and the troubled conditions that afflicted the entire region during the succeeding decades, the community continued to function with considerable vigour, albeit with a reduced population. By a strange irony Anemurium offers us a far more vivid picture of daily living in this final phase of its existence than in any of its more prosperous periods.[13] The reduced circumstances of this seventh-century community are well illustrated by the fate of the baths-palaestra complex, which had long since ceased to serve its intended function. Simple village houses had by now encroached upon the open spaces of the palaestra, while the vaulted halls of the adjacent baths, now stripped of their marble decoration, were gradually transformed into an area that accommodated a variety of industries, including a lime-kiln, flour-mills, and potteries. The product of at

12 *Ibid.*, 70–4.

13 The archaeological evidence is summarized in J. Russell, "Transformations in Early Byzantine Urban Life: The Contribution and Limitations of Archaeological Evidence," in *The 17th International Byzantine Congress: Major Papers* (New York, 1986), 137–54, esp. 144–50 and nn. 28–37.

PLATE 8. Private house of early Byzantine date resting on the mosaic pavement of the Roman palaestra.

least one of the pottery kilns is attested in the discovery of clay moulds for terra-cotta lamps. One mould in the form of a human face belonged to a type represented in a hoard of over 720 lamps found concealed in the disused heating system of one of the baths, probably the owner's stock deposited during one of the various military crises occasioned by the activities of Persians or Arabs during the city's last years.[14]

As for the homes of the artisans who earned their living in the smoky atmosphere generated by the industries housed in the baths, the walls, though of coarse construction, remain standing several courses high. The presence of stairs suggests a second storey in at least one establishment, while sunken storage *pithoi* or vats and earthen bread ovens, the *tandir*, to be seen in use even today in parts of Turkey, are found in several. The best preserved is a rectangular building constructed in a technique still practised in the neighbourhood (Plate 8). This consists of a skeletal structure of corner and interval piers composed of well-mortared masonry, the intervening gaps filled with dry stones. A doorway in the east wall leads into a corridor that divides the house into two halves. A large room occupied the south half of the building, evidently a kitchen with a wall chimney as outlet for an enclosed hearth covered by a cooking slab.

14 H. Williams and P. Taylor, "A Byzantine Lamp Hoard from Anamur (Cilicia)," *Anatolian Studies*, 25 (1975), 77–84.

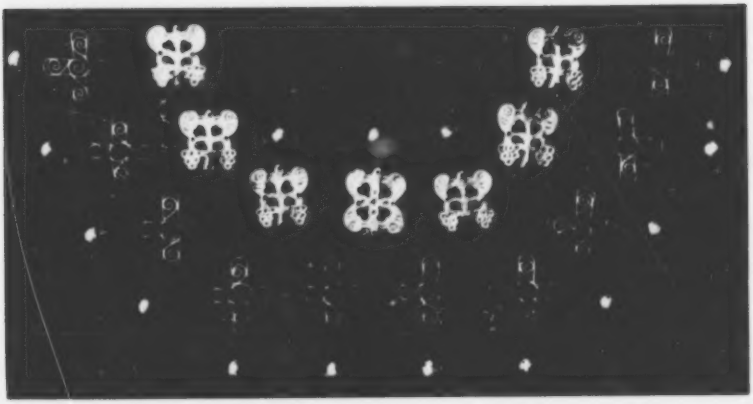

PLATE 9. Gold treasure found in late sixth-century grave discovered in Church III 13 C.

Shortly after the middle of the seventh century even this modest community had ceased to exist, victim no doubt of Arab raids. Since there is no sign of violent destruction or last-ditch struggle, we may presume a gradual evacuation of the site, probably in favour of the security of the mountains that enclose the coastal plain. With the passage of time the pisé or tile roofs of the abandoned houses caved in, followed eventually by the walls, sealing in any coins, pottery, and assorted odds and ends rejected or overlooked by the last occupants at the time of their departure. The significance of coins and pottery discovered in contexts such as these hardly requires comment. They are vital in establishing the chronology of the destruction horizon to which they belong. Just as significant for our understanding of the last inhabitants of the ancient city, however, is the heterogeneous collection of everyday objects found in the same contexts. At Anemurium the inventory of small finds amounts to some 500 individual items, which do not include numerous unidentifiable scraps of metal, bone, and other materials. Although this miscellaneous assortment of objects may appear trifling at first sight, the cumulative total drawn from so many facets of daily life affords, if carefully analysed, a detailed documentation of Byzantine economy and society within the setting of a specific community.[15]

Trades and crafts are represented by a variety of tools, the carpenter's chisel, the fish-hook and netting-needle of the fisherman, the builder's plumb-bob, the tailor's thimble and the heavy needle used by a sail-maker or leather-worker;

15 For a preliminary discussion of the small finds, with detailed analysis of belt-buckles, see J. Russell, "Byzantine *Instrumenta Domestica* from Anemurium: The Significance of Context," in R.L. Hohlfelder, ed., *City, Town and Countryside in the Early Byzantine Era* (New York, 1982), 133–63.

the lead stamp of one Sergius, perhaps a tile-maker. Coins, lead seals, and weights from the marketplace appear in abundance, as well as fragments of balance scales and steelyard weighing apparatus. Evidence for how these same artisans and shop-keepers furnished their homes is also to hand. From the heavy wooden chests that stored their dowries and other treasures we have the decorated hasps and hinges and fragments of copper-sheathing; lock-plates and keys of varying shapes and sizes represent measures taken to secure the same strongboxes. Fragments of kitchen utensils survive in a skillet-handle with heat-guard, bronze jug handles, and an iron strike-a-light. The departing inhabitants left some of their games and amusements, including bone dice and gaming counters. Female vanity was indulged with copper and bone hair-pins, plain and decorated, and in various shapes and sizes of cosmetic scoops and spatulas to apply kohl, the dark blue paste still used by women to adorn themselves in the Middle East. Breeches seem to have been the normal garb for men, to judge from the numerous copper belt-buckles found. Jewellery took the form of silver earrings, silver and bronze finger rings, and pendants. A complete set of female jewellery was found in a contemporary grave from one of the churches, including ten open-work crosses framing a simple spiral decoration, seven plaques of gold sheeting in a punched design of dolphins and bunches of grapes (Plate 9).[16] The religious devotion of ordinary individuals is well illustrated in a variety of crosses, the most unusual being a pendant gold cross with glass paste *en cloissoné*, but Christian sentiment could find expression in something as humble as a simple belt-buckle. The malignant world of evil spirits and the Evil Eye was countered by wearing amulets such as a pair of copper plaques, one depicting Solomon as a horseman striking down a prostrate female demon, the other representing the Evil Eye being assailed by a variety of sharp instruments and wild animals, with the legend KYPI BOHΘI.[17] On rare occasions the floors yielded an *objet d'art* such as the unusual steelyard weight made of lead and encased within the bronze bust of the goddess Athena, protected by a Gorgon Medusa (Plate 10)—a sharp reminder of the tenacity of the classical tradition in a remote corner of the ancient world on the very eve of its extinction.[18]

With so much material covering a wide range of date and genre to process, we have ceased excavation and are now devoting our efforts to publishing the results. The first final report, on the Mosaic Inscriptions, has been published and others are close to completion. Apart from publication, one major responsibility remains to be fulfilled, namely the conservation and consolidation of the most important of the mosaics uncovered in the course of the project. The

16 Illustrated in *Classical Views*, n.s. 2 (1983), 179, Plates 13–14.

17 These and other apotropaic objects from Anemurium are discussed in J. Russell, "The Evil Eye in Early Byzantine Society," *Jahrbuch der Österreichischen Byzantinistik*, 32:3 (1982), 539–48.

18 C.W.J. Eliot, "A Bronze Counterpoise of Athena," *Hesperia*, 45 (1976), 163–70.

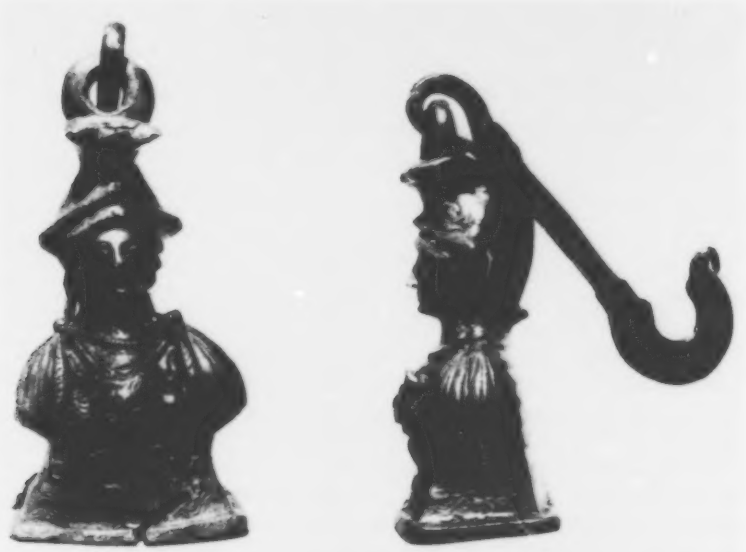

PLATE 10. Bronze counterpoise weight in the form of the goddess Athena, early seventh century.

campaign commencing in the summer of 1987 will mark the beginning of this work when we lift some of the most fragile and vulnerable mosaics and remove them to Anamur, the modern successor of the ancient city, where the Turkish authorities have recently erected a museum to house the finds from Anemurium.

JOHN PETER OLESON*

Technology and Society in Ancient Edom: The Humayma Hydraulic Survey, 1986†

THE FIRST SEASON of the Humayma Hydraulic Survey took place between 31 May and 26 June, 1986. This project, funded by a three-year grant from the Social Sciences and Humanities Research Council of Canada and by the Faculty of Arts and Sciences of the University of Victoria, has as its objective the analysis of the character and evolution of the system of water-supply of the ancient settlement of Avara during the Nabataean, Roman, Byzantine, and Umayyad periods. The project is licensed by the Department of Antiquities of the Hashemite Kingdom of Jordan.[1]

The site of ancient Avara, now called Humayma, was one of the major Nabataean centres in the Hisma, Jordan's southern desert.[2] It is located 15 km. west of the modern Desert Highway, approximately equidistant between Aqaba

* Department of Classics, University of Victoria.

† Presented to the symposium, "Canadian Editors and Diggers Abroad," McMaster University, 2 June, 1987.

1 The author is Project Director; the Field Assistant is Mr. Andrew Sherwood, Princeton University; the Representative of the Department of Antiquities in 1986 was Mr. Suleiman Farajat. Through the kind permission of the Ministry of Education the team was allowed to live in a school building at New Humayma. I am very grateful to Dr. Hadidi, Director of the Department of Antiquities, for granting a permit for this season's work, for his advice on the project, and for helping with the practical arrangements. I would also like to thank Professor John Eadie, Michigan State University, who holds the original permit for the site of Humayma, for permission to initiate this related project. Dr. David McCreery and Mr. David Jacobsen of the American Center of Oriental Research, Amman, provided invaluable advice and logistical assistance during the 1986 season and the year of preparation that preceded it.

2 For the bibliography on Humayma, see J.W. Eadie and J.P. Oleson, "The Water-Supply Systems of Nabataean and Roman Humayma," *Bulletin, American Schools of Oriental Research*, 262 (1986), 73–6. Add J.W. Eadie, "Humayma 1983: The Regional Survey," *Annual of the Department of Antiquities, Jordan*, 28 (1984), 211–24; S. Gregory and D. Kennedy, *Sir Aurel Stein's Limes Report*, British Archaeological Reports, Intl. Series, no. 272 (Oxford, 1985), 317–29, 433; W.J. Jobling, "The Fifth Season of the 'Aqaba-Ma'an Survey,

on the south and Ma'an on the north. The relatively good preservation of the site, its well-marked urban or proto-urban focus, and the clear definition of its catchment area and hydraulic resources make it an excellent candidate for a case study of Nabataean hydraulic technology.[3] Much has been written about Nabataean skills in intercepting and storing water in the arid region they inhabited, but no integrated analysis of their capabilities has yet appeared. Furthermore, the precise character of the reworking of this technological inheritance by the Romans after their occupation of the kingdom in the early second century has never been properly documented.[4] The goal of the Humayma Hydraulic Survey is publication of the first full evaluation of all the water systems at a well-preserved Nabataean site, taken in their historical and technological context.[5] The project will also address broader questions, such as the origins of the Nabataean skill in hydraulic technology, and the cultural reasons for differences between Nabataean, Roman, and post-Roman use of the scarce desert water resources.

In 1983 I carried out several soundings in reservoirs within the settlement and surveyed part of the aqueduct.[6] The more comprehensive survey of hydraulic technology just begun will stretch over three seasons of field work. The first—completed in the summer of 1986—involved the careful survey of the natural catchment area of Avara to locate and catalogue all water resources and the structures associated with their exploitation. Included were springs,

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1984," *Annual of the Department of Antiquities, Jordan*, 28 (1984), 191–202; J.P. Oleson, "Survey and Excavation of the Nabataean and Roman City of Humayma (Jordan)," *Classical Views/Echos du Monde Classique*, 28 (1984), 235–48; P. Mayerson, "The Saracens and the *Limes*," *Bulletin, American Schools of Oriental Research*, 262 (1986), 35–47; J.P. Oleson, "The Humayma Hydraulic Survey: Preliminary Report of the 1986 Season," *Classical Views/Echos du Monde Classique*, 31 (1987), 263–72.

3 I have tried to avoid as much as possible applying the term "city" to the site, since it still is not clear how appropriate that term is to Avara or any other Nabataean settlement. There is a good discussion of the question of the nature of Nabataean "urbanism" in A. Negev, "The Early Beginnings of the Nabataean Realm," *Palestine Exploration Quarterly*, 108 (1976), 132–3; "The Nabataeans and the Provincia Arabia," in *Aufstieg und Niedergang der römischen Welt*, II.8 (1977), 586; *Nabataean Archaeology Today* (New York, 1986), 29–68. The failure to come to grips with this question is one problem with Kenneth C. Gutwein, *Third Palestine: A Regional Study in Byzantine Urbanization* (Washington, D.C., 1981). The existence of the aqueduct at Humayma may have spared it some of the demographic instability that seems to have been characteristic of the settlements in this region that depended entirely on the sporadic local precipitation. On this question, see P. Mayerson, "A Note on Demography and Land Use in the Ancient Negeb," *Bulletin, American Schools of Oriental Research*, 185 (1967), 39–43. Examination of the character of the water system inside the settlement area of Avara should help to clarify the nature of such Nabataean centres.

4 The most important studies are cited in Eadie and Oleson (n. 2 above).

5 A doctoral dissertation presented at the Sorbonne in 1983 by Al-Muheisen Zeidoun, *L'Alimentation en eau de Petra*, provides an admirable catalogue of the evidence for hydraulic technology in Petra, but the analysis is only rudimentary. There is a copy of this dissertation in the Department of Antiquities Library, Amman. There is a brief but useful systems analysis of regional water supply in J.D. Elliot, Jr., *The Eleusa Oikoumene, A Geographical Analysis of an Ancient Desert Ecosystem Based on Archaeological, Environmental, Ethnographic, and Historical Data*, Cobb Institute of Archaeology, Mississippi State University, Occasional Papers 82-01 (State College, Miss., 1982).

6 Reported in Oleson 1984 (n. 2 above); Eadie and Oleson (n. 2 above).

cisterns, wadi barriers, artificial terraces and cleared fields, an aqueduct, and a dam. The second season, scheduled for summer, 1987, will involve searching out and cataloguing all such facilities within the habitation area proper, particularly reservoirs and cisterns. Where necessary, excavation will be carried out to determine the nature of the internal distribution system and its chronology. During the third season, scheduled for 1988, I will examine structures associated with hydraulic technology at other Nabataean and Roman sites in Jordan and the surrounding regions as comparative material.

EXECUTION OF THE 1986 SURVEY

The area selected for survey in 1986 covered 240 square kilometres. The survey of such a large area was feasible because our goals were circumscribed and strictly defined and the structures targeted were very characteristic in design and usually easy to spot in the barren landscape. The survey strategy was judgmental, and we did not attempt to record all evidence for past human occupation of the region.

The survey area was essentially the drainage catchment between Humayma and the al Sharah escarpment, along with the Wadi Qalkha and its tributaries from Humayma proper as far south as the modern Ma'an-Aqaba highway (Figure 1). The northern boundary was the crest of the escarpment between 'Ain el Ghana and the line of the new highway just below Ras en Naqb. The line of the new road was taken to define the eastern and southern border. Although this last boundary is artificial in strictly archaeological terms, it does in fact include slightly more than the rainfall catchment area along its northern portion. It terminates 10 km. south of the site at the natural southern boundary of the territory presumably presided over by Avara: the gap between the flat-topped Jebel Thaur and Hudeibat Um Dureira, through which passes the Wadi Qalkha. The western limit was taken to be the boundary between the Wadi el Jamam and Wadi el Beida watersheds. The former feeds the Wadi Qalkha, which passes close by Humayma. The latter leads into the Wadi el Hilwa, which dives steeply through the western mountains to the Wadi Araba. Exceptions were made, of course, for sites like 'Ain el Ghana, which is in the Hilwa watershed but is connected to the settlement centre by an aqueduct, and for several sites on the southeastern slopes of the hills along the highway which are outside the watershed but well within Avara's probable area of interest. South of Humayma, the western boundary of the survey area was formed by the crest of the Jebel Qalkha, which backs up against the precipitous descent to the Wadi Araba, and by the lower slopes of the Jebel Thaur, which towers over the pass down the Wadi Yutum to Aqaba.[7]

7 Y. Kedar, "Ancient Agriculture of Shivtah in the Negev," *Israel Exploration Journal*, 7 (1957), 178–89, notes that the boundaries of the agricultural land and run-off fields around Shivta correspond with the limits of the watershed of the surrounding region. It is interesting, and possibly significant, that these natural areas exploited for soil and run-off water at Avdat and Shivta are similar in scale to the 240 km.^{2} at Humayma: 282.5 km.^{2} and 197.5 km.^{2} respectively.

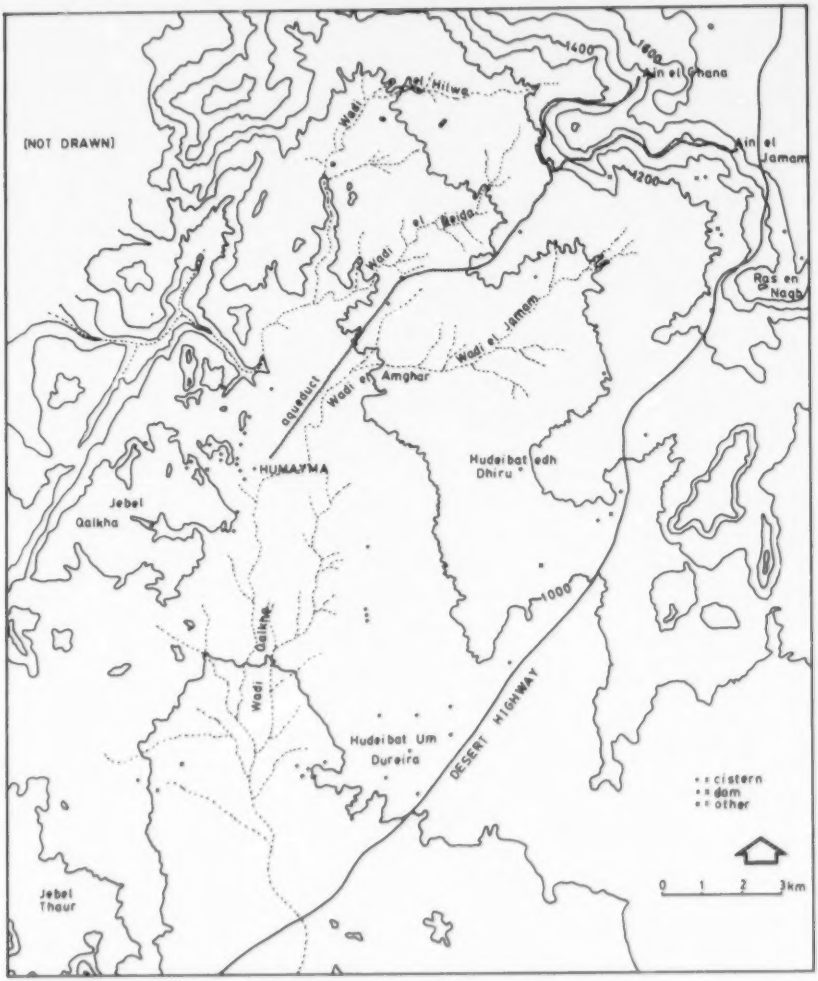

FIGURE 1. Humayma: map of survey area. (Map: Oleson)

In simplified form this area can be visualized as two great amphitheatre-shaped valleys just north and just south of Humayma, separated from each other by a low ridge extending west from the Hudeibat edh Dhiru (adjacent to the new highway) almost as far as the site itself, cut off from it by the wide bed of the Wadi el Amghar. The winding courses of the Wadi et Jamam and Wadi el Amghar in the north and the great Wadi Qalkha in the south form their respective foci. From the settlement site the crest of the escarpment can be

reached in about five hours of walking, the eastern edge of the Hudeibat edh Dhiru in two hours, the intersection of the Wadi Qalkha and the new highway in about three hours, and the sheer cliffs overlooking the Wadi Aheimir, west of Humayma, in about one hour. The 1986 campaign began at the periphery of this survey area and worked toward the settlement site near its centre, treating the aqueduct as a single feature that was examined separately. The modern network of dirt roads and tracks provided relatively easy access to much of the area by four-wheel-drive vehicle, but the search for hydraulic installations was carried out for the most part on foot. As each new site was discovered, relevant data were entered on standard site record sheets, and each site was assigned a number for ease of reference. No excavation other than minor surface clearing was carried out this season, but the nature of ceramics observed on the surface was recorded, and samples of building materials were collected.

RESULTS

Sixty-one sites were recorded during the 1986 survey. Some of these contained several different types of structure or several examples of a single type. The results can be tabluated as follows:

51 cisterns
4 springs
1 aqueduct
1 dam
2 sets of wadi barriers
6 sets of terraces or stone piles

Cisterns

The predominant category clearly is that of cisterns. Nineteen of the cisterns (all but one of them cut in the bed-rock) are only possibly ancient. The design or present condition of the remaining thirty-two examples marks them out clearly as ancient in origin, although the precise chronology cannot yet be determined. Only two of these ancient cisterns are built mostly of blocks rather than cut in the bed-rock. Of the remaining rock-cut cisterns, sixteen were unroofed, roofed with stone slabs, or roofed with an undisturbed stratum of bed-rock (Plate 1). The other fourteen were roofed in typically Nabataean fashion by means of stone slabs carried on arches springing from the side walls of the cistern basin. One of these must be the best-preserved unrestored Nabataean cistern known: four of the five arches were intact, carrying nearly all their original roofing slabs (Plate 2).

Springs

The three springs that fed the aqueduct—'Ain el Ghana, 'Ain el Jamam, and 'Ain Sharah—must have been critical to the water-supply system of Hum-

PLATE 1. Humayma: cistern no. 26. Rock-cut channels, settling tank, cistern opening. (Photo: Oleson)

PLATE 2. Humayma: cistern no. 45. (Photo: Oleson)

ayma, because their discharge was brought to the settlement at enormous effort through 27 km. of conduit. The course of the aqueduct is shown by a dotted line on the map. At present the springs discharge an average total of 2.2 m.^{3}/hour: the 'Ain el Jamam and adjacent 'Ain Sharah are by far the most prolific.[8] The maximum possible flow through the aqueduct can be calculated at 6.2 m.^{3}/hour, almost three times the flow available at present. Since our survey documented the connection of these three springs with the aqueduct leading to Humayma, it is puzzling that the only other major spring in the region, the 'Ain 'Abu 'Insor, approximately 2.25 km. southeast of 'Ain el Jamam, does not seem to have been connected to this water-supply system. Jobling has assumed that the 'Ain 'Abu 'Insor was connected to the aqueduct, but a careful search by my team for evidence of a branch channel between this spring and the 'Ain el Jamam produced nothing.[9] Construction of the new highway has disturbed much of the intermediate area, but at least some traces of the channel's highly characteristic conduit blocks should have survived and they existed there. It may be that the flow of this spring was less in antiquity than its present 0.9 m.^{3}/hour. In this case it could have been completely exhausted by the needs of the adjacent Nabataean and Roman military post, the remains of which are still visible 100 m. to the south.

Aqueduct

The aqueduct leading to Humayma is the most remarkable surviving example of Nabataean hydraulic technology so far reported anywhere. Even in isolation it would make the site memorable. The main line extends from 'Ain el Ghana at an elevation of 1425 m. for 18.901 km. to the Nabataean reservoir at the north end of the habitation centre, at 955 m. A branch line 7.625 km. long connected 'Ain el Jamam and 'Ain Sharah, also at an elevation of 1425 m., to the main line, joining it 6.557 km. downstream from 'Ain el Ghana. In summary, the aqueduct structure consists of a heavy rubble foundation wall 0.80 m. across, carrying long stone conduit blocks framed by rubble packing set in mortar (Plate 3). A water channel 0.12 m. wide and 0.14 m. deep has been carved lengthwise along each of the monolithic conduit blocks. These are made of yellow marl or white sandstone, depending on the geology of the region the aqueduct traverses. The construction material was quarried locally.

Along almost the entire course of the aqueduct the conduit blocks have been exposed by the decay of its superstructure, but this year for the first time intact sections were identified that revealed the method of roofing the channel. Fist-sized pieces of rubble were set in a hard mortar on the upper edges of the conduit blocks alongside the trough and smoothed over with stucco on the

8 The statistics on water flow were provided through the kindness of Mohammed Abu Taha of the Irrigation Authority, Amman.

9 W.J. Jobling, "The 1982 Archaeological and Epigraphic Survey of the 'Aqaba-Ma'an Area of Southern Jordan," *Annual of the Department of Antiquities, Jordan*, 27 (1983), 188.

PLATE 3. Humayma: aqueduct channel, below Jebel Ghana. (Photo: Oleson)

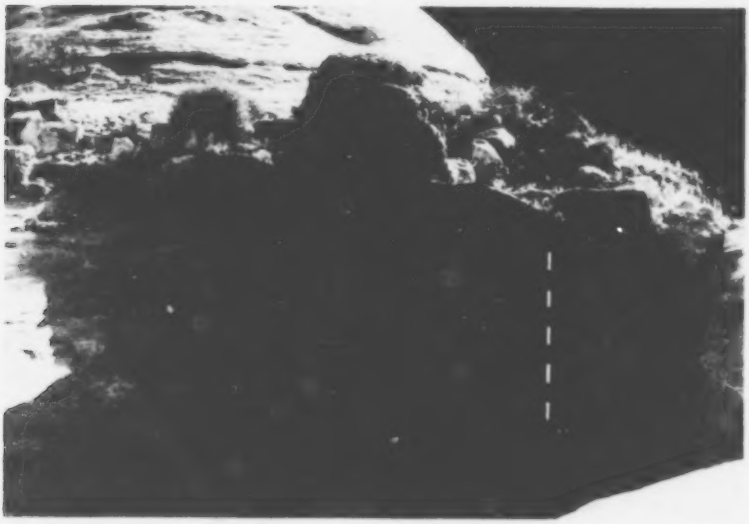

PLATE 4. Humayma: aqueduct bridge, below Jebel Ghana. (Photo: Oleson)

interior. Untrimmed, but for the most part flat, slabs of limestone were laid over the top, covering the water course. This roofing was designed to protect the water from evaporation, contamination, obstruction by falling debris, and possibly from unauthorized diversion. A still unexplained feature is the use of inverted rooftiles set inside the conduit blocks in the Jamam branch to carry the water. The 1986 survey documented for the first time the presence of several draw tanks along the course of the aqueduct.

The use of a hand-operated odometer wheel permitted highly accurate recording of the aqueduct, starting from the springs and ending at Humayma. In this way, precise measurement of the enormous structure was accomplished and the location recorded of features of special interest encountered along the way. Slopes were calculated by means of a pocket level. The remarkable variations in the slope of the aqueduct, only now accurately charted, continue to be astonishing. The average slope from the springs to the terminal reservoir is 2.45 per cent. The actual slope varies constantly, however, from slightly less than 1 per cent at either end to 10, 20, and even 45 per cent for precipitous sections along the al-Shera escarpment. Although the loss of water from the steepest sections must have been considerable, water deposits in the channel are just as thick here as elsewhere in the conduit. At other points along the descent of the al Sharah escarpment there were bridges and viaducts (Plate 4).

Dam

A large, beautifully constructed, and splendidly preserved dam was found late

PLATE 5. Humayma: dam south of settlement. (Photo: Oleson)

in the season in a small canyon just south of Humayma (Plate 5). This structure (L 10.66 m., W 4.36 m., H 3.65 m.) was built of blocks of limestone set in mortar in a head-and-stretcher arrangement, and the spillway, the most vulnerable part of any dam, was cut into the bed-rock at one end. Sand has completely filled the basin upstream, but it still retains a significant amount of water, which trickles out slowly between several of the blocks. The location, coursing of the blocks, and presence nearby of a Nabataean inscription cut in the canyon wall confirm its Nabataean character. Rock-cut stairs give access from below to the upper surface of the dam, where water could have been obtained by dipping. The canyon walls are too steep and high to allow any other approach.

Wadi Barriers

Although the Bedouin around Humayma now commonly make use of earth and stone wadi barriers to slow the process of erosion and foster the infiltration of run-off water into their fields during the winter, only two possibly ancient structures of this type were catalogued. By their very nature, such barriers are vulnerable to complete destruction, and in the immediate vicinity of Humayma the recent use of tractor-drawn plows in the ancient fields has obliterated any traces. One of the two sets of barriers tentatively accepted as ancient differs from the modern examples in being constructed of large boulders rather than earth or small stones. The antiquity of the other is suggested by the presence nearby of ancient architectural remains.

Terraces and Stone Piles

The clearing and terracing of slopes was a method used by the Nabataeans, along with most other Near Eastern peoples, to improve and protect arable land on such terrain. In addition, the terraces help hold back water running off the slopes after a rain and thus increase absorption. Only six sites with this feature were identified, perhaps because the local geology makes most of the sloping ground around Humayma totally unsuited for agriculture. In one case, a field was simply cleared of surface stones by heaping them in orderly rows of piles. This procedure freed some ground for agricultural activity, but it may also have been intended, as at Nabataean sites in the Negev, to increase run-off to a field lying below.[10]

PRELIMINARY ANALYSIS

The water-supply system of ancient Avara was regional in scope and varied in its strategy. The rock-cut cisterns and wadi barriers are located around the

10 See M. Evenari, L. Shanan, and N. Tadmore, *The Negev, The Challenge of a Desert*, 2nd ed. (Cambridge, Mass., 1982), 127–47; also Y. Kedar, "Water and Soil from the Desert," *Geographical Journal*, 123 (1957), 179–86, on the relationship between the area of cultivated land and that of the adjacent run-off fields.

periphery of the catchment area, where the bed-rock is at the surface and the topography fosters rapid, directed run-off of rain water (see the pattern of + marks on Figure 1). Few cisterns were built in the lowland area around the settlement centre, in the land most suited for agricultural use. Construction would have been more difficult here, since the bed-rock is inaccessible and local run-off is more scanty in the absorbent, sandy soil. Only in the habitation centre itself, where the concentration of population required it, and where the aqueduct and roofs of houses supplied artificial catchments, were cisterns routinely built entirely of blocks. The cisterns around the periphery of the Humayma catchment must have been intended primarily to sustain livestock and the herdsmen and farmers spread thinly over the region. Rainfall is too meager and evaporation too extensive to allow dependence on irrigation for major crops.[11] The wadi barriers and terraces were designed to counter these factors and enhance the moisture content of the soil. The placement of most of these cisterns close to the border between bed-rock and arable land is consistent with this interpretation. Both farmers in the nearby fields and herdsmen leading their flocks from field stubble to wild brush land and back again could have made use of such a location. This pattern still holds good today.[12]

All these structures must have been planned and built by individuals, and consequently privately owned. The aqueduct, by contrast, must have been a public structure. It is by far the longest known Nabataean aqueduct, and it is longer than any other pre-Roman aqueduct I know of in the Near East, with the exception of that serving Herodian Jerusalem.[13] The concentration of resources needed for its construction shows that it was felt to be critical to the survival of the settlement. Only excavation can reveal whether it was built when Avara was founded, to ensure the viability of the settlement, or later on, when the population had outgrown the local water sources. What is significant is that Avara reached out farther into the countryside for its water than any other pre-Roman settlement in the Near East. The extent of this effort implies as well the existence of highly developed social mechanisms within the settlement for governing the distribution and use of the water. Excavation within the habitation centre in 1987 should shed light on these important questions of planning and allocation.

11 See Eadie and Oleson (n. 2 above), 72.

12 There is a long-standing, lively debate between those scholars who see the relationship between farmers and nomads as one of cooperation and reciprocal benefit ("mutualism") and those who see it as typically one of conflict and competition. For examples of both views, and relevant bibliography, see E.B. Banning, "Peasants, Pastoralists and *Pax Romana*: Mutualism in the Southern Highlands of Jordan." *Bulletin, American Schools of Oriental Research*, 261 (1986), 25–50; S. Thomas Parker, "Peasants, Pastoralists, and *Pax Romana*: A Different View," *Bulletin, American Schools of Oriental Research*, 265 (1987), 35–51.

13 Parallels for the aqueduct are cited in Eadie and Oleson (n. 2 above), 69–70.

HECTOR WILLIAMS*

Archaeological and Geophysical Investigations at Stymphalos and Lesbos†

THE CANADIAN ARCHAEOLOGICAL INSTITUTE in Athens, an organization supported by grants from the SSHRCC, private donors, and over forty Canadian colleges, universities, and other public institutions (including the Royal Society), has since 1980 sponsored a number of archaeological projects in Greece. Two of these projects have attempted to investigate little-known areas of Greece like northeastern Arcadia and the island of Lesbos in the northeastern Aegean; each has also involved the use of new—to Greece—techniques of geophysical survey to recover, in the case of Stymphalos, a city plan without excavation, and, in the case of Mytilene (Lesbos), to determine suitable areas to dig.

Stymphalos is a completely abandoned city of classical antiquity that lies some six hundred meters up in the mountains of Arcadia by the lake of the same name. Small scale excavations were carried out some sixty years ago, but never published except in brief reports, by the late Anastasios Orlandos on behalf of the Archaeological Society of Athens, which kindly agreed in 1982 to allow us to survey the site. Building foundations were visible both directly and through parch marks in the soil over much of the eastern part of the city, although modern agricultural methods are quickly eradicating them. A plan of these remains in 1982 revealed a hitherto unknown example of regular grid planning in this isolated mountain zone as well as revealing the extent of the city's fortification walls. Large areas in the plan were still blank, however, and in 1983 and 1984 we conducted resistivity and magnetometer surveys in order to

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trace buried walls and streets. Using technology developed at Bradford University we were able to process the results in the field with a battery-powered Epson HX20 computer and to determine immediately areas worth further attention. A dot density printout indicated areas of high resistance that mark ancient features. Not only did the grid system emerge in remarkable detail but even the plans of courtyards, houses, and possible public structures like gymnasia could be clearly discerned. Missing sections of the north wall of the city, plundered in the thirteenth century to build a nearby Cistercian monastery, were also filled in, complete with towers and a gate formed by an overlap of walls. Even more interesting was what the plan revealed about town-planning in the fourth century B.C. when Stymphalos was laid out, perhaps as a new town for Arcadian mercenaries returning wealthy from the wars of the period. The resistivity survey revealed that the north-south streets did not run continuously through the length of the city but jogged about half-way up. Aristotle in his *Politics* suggests such a device to avoid giving an enemy who may have broken into one's town a clear run through it.

We have also been using aerial photography by kite to obtain a clearer picture of what survives. Visible are the lines of the city wall as well as the street grid on the eastern side; a vertical photograph reveals not only the street and adjacent buildings but even the drainage ditches along the street edge, a feature we have already noticed on the resistivity printouts. Also clearly visible is the Frankish abbey, built in good part with material from the nearby ruins but with an admixture of western European Gothic remarkable in such a desolate spot.

Our survey work around the city has revealed traces of at least four cemeteries; tombstones—a majority are of women—are being ploughed up in some number by heavy tractor drawn ploughs, although luckily the graves themselves lie deep enough to be safe, for the moment. We are also able through surface survey, parch marks in vegetation, and geophysical survey to follow the remains of a Roman aqueduct, probably built in the time of Hadrian (A.D. 117–38), from the perennial springs that still bubble out of the mountains nearby to an underground tunnel under a pass to a neighbouring valley.

What our survey cannot tell us, of course, are dates; surface pottery indicates small scale Bronze Age inhabitation on the site but the style of the fortifications—especially the presence of towers for artillery—indicates that our city goes back no earlier than the fourth century B.C. A general lack of Roman material indicates that by the time of Christ the city had shrunk to a very small scale and indeed by late antiquity was abandoned entirely.

Such is not the case with our second site, Mytilene, the most important city now as in classical antiquity of the island of Lesbos. A prosperous modern town occupies most of the ancient site, making systematic investigation impossible. Although Mytilene was the major centre of the Aeolic Greek world and famous for its poets (like Sappho and Alcaeus) and its theatre, said to have inspired the first permanent theatre in Rome, there has been little work done there since a German survey of the 1880s. In 1982 the new town council of Mytilene invited

the Canadian Institute to begin study and excavations, and since that time annual campaigns of increasing size have been undertaken with support from the SSHRCC and other donors.

Fortunately there are some clear areas for excavation, especially on the acropolis of the ancient city (once an island) that is now occupied by a Byzantine and Genoese castle. An initial geophysical survey inside the castle walls revealed a number of potential targets, and test trenches have revealed again both the value and limitations of the method. A clear massive east-west feature that could have been a temple platform in fact turned out to be an early Turkish road. Beside it, however, was a stratified series of deposits going back to the third century B.C. that revealed through the hundreds of votive objects—including a terracotta figurine of a worshipper—the presence of a Greek sanctuary, almost certainly to the goddess Demeter. In 1985 we discovered altar foundations under later Turkish walls but restorable to a stone base three metres long with a mud brick superstructure; around it were the remains of hundreds of sacrificial birds and animals, this year to be studied by a palaeozoologist. Another unexpected discovery was a new type of Roman fine ware of the late first century B.C., possibly made on the neighbouring island of Tenedos, perhaps in imitation of more expensive metal vessels. More extensive excavations in the area in 1986 revealed a cache of nearly 300 oil lamps used in night-time ceremonies of worship and then offered to the goddess. Of great importance for our knowledge of the fine pottery of the region was the discovery of an enormous deposit of grey-black glazed wares dated by the Athenian imports with them to the late fifth century B.C. Such wares are typical in the northeast Aegean in both archaic and Hellenistic periods, but had never been attested before in the fifth and fourth centuries; we thus appear to have found a missing link.

Elsewhere in the castle a magnetometer survey revealed a curving feature just east of a nineteenth-century mosque; excavation in 1986 uncovered the apse of a Byzantine church, probably converted to a mosque after the Turkish capture of Lesbos in the fifteenth century and subsequently destroyed in an earthquake. The large added platform on its north side provided a base for the minaret. Extensive traces of much disturbed burials appeared through the area, although dating evidence was unfortunately lacking. The presence nearby of a massive marble sarcophagus with the Gattilusi coat of arms suggests that we may have the burial chapel of that noble Genoese family that ruled the northern Aegean for over a century until the coming of the Turks.

In the lower town of Mytilene near the north harbour we have been excavating jointly with the local museum a site started twenty-five years ago by the late Seraphim Charitonides but never completed or published. On the site of a Turkish cemetery and subsequent Greek stables the lot revealed not only a well preserved section of the classical city wall, standing two metres in places, but also an interesting Roman building of the third century A.D., organized around an ornamental pool with a colonnaded courtyard, off which were large

well appointed rooms decorated with wall paintings (now in poor condition) and marble or mosaic paved floors. Over the entire complex, however, was an abandonment level full of pottery, lamps, and coins of the first half of the fourth century A.D. The presence of large quantities of drinking cups (including the latest appearance anywhere of Çandarli ware, a fine table ware of the imperial period) and some erotic material like a Corinthian lamp (the first such import found on Lesbos) suggests that at least in its final state the building had become a tavern or even a brothel. Further work in 1987 may clarify the matter; the building certainly belongs to a class of similar structures that have been found in several salvage excavations around the town, most notably the "House of Menander" famous for its third-century mosaics with scenes from the plays of that writer. Our "house" also produced the first sun dial found on Lesbos, one of a rare type found formerly only in the islands of Kos and Rhodes.

High ground-water levels have prevented extensive excavation below Roman levels, but large quantities of pottery from the fourth and third centuries B.C., including moulds for making bowls, are throwing light on the local ceramic industries. Other industrial aspects of Mytilene that we are investigating include the aqueducts and the quarries at nearby Moria and Thermi that produced marbles mentioned by the Roman writer Pliny the Elder. Eventually we hope to return to Stymphalos to dig as well and to answer the questions that only excavation can settle.

Award Winner
Lauréat médaillé

KEITH J. LAIDLER, F.R.S.C.*

The Second Half-Century of Physical Chemistry†

THE BIRTH OF physical chemistry is conveniently regarded as having occurred just one hundred years ago, in 1887. My own research career in physical chemistry, begun just fifty years ago in 1937, thus spans the second half-century of the subject. It is of interest to consider the work in physical chemistry during the past fifty years, and to compare it with what was done during the previous fifty years.

Whereas a person's year of birth can usually be assigned precisely, the same is not true of the birth of an intellectual discipline. My choice for physical chemistry is 1887, a year of special significance, for it was then that Wilhelm Ostwald (1853–1932) and J.H. van't Hoff (1852–1911) founded the world's first journal of physical chemistry, the *Zeitschrift für phyikalische Chemie*, and that Svante A. Arrhenius (1859–1927) published his pioneering theory of electrolytic dissociation in solution. Also in that same year Ostwald was appointed professor of physical chemistry at the University of Leipzig, and the second and final volume of his *Lehrbuch der allgemeinen Chemie*—the first textbook of physical chemistry—was published. It is true that the expression "physical chemistry" had been used as early as the eighteenth century and that Ostwald was the *second* occupant of the Leipzig chair of physical chemistry. Moreover, important work in physical chemistry had certainly been done before 1887; for example, there was the pioneering work of A.G. Vernon Harcourt (1834–1919) and W. Esson (1839–1916) in chemical kinetics, begun in 1865, and van't Hoff's important investigations in the same field, summarized in 1884 in his book *Etudes de dynamique chimique*. However, only in 1887, with the publication of the new *Zeitschrift*, did scientists begin to

* Department of Chemistry, University of Ottawa.
† The Henry Marshall Tory Medal Address, McMaster University, 2 June, 1987.

recognize the emergence of a well-defined subdiscipline, which was concerned with the formulation of physical principles that related to the whole of chemistry and which made important contributions to other branches of science such as physics, biology, and geology.

The new subject of physical chemistry was slow to become accepted as a reputable endeavour, and it encountered some hostility even towards the end of its first half-century. van't Hoff's famous theory of the "tetrahedral carbon atom," now recognized as fundamental to our understanding of the shapes of organic molecules, was subjected to a particularly vitriolic attack by the eminent but unpleasant organic chemist H. Kolbe (1818–84). Kolbe's complaint was not that the theory was inconsistent with experimental evidence but rather that suggestions relating to molecular shapes were not to be contemplated in polite scientific circles—he even went so far as to say that van't Hoff's ideas were akin to a belief in witchcraft. Later, Ostwald's important early work in physical chemistry was attacked by chemical colleagues who complained that Ostwald was not a true chemist since he had never discovered a new compound. To this Ostwald, a cheerful extrovert, retorted that the number of compounds he had discovered was minus one, since he had shown (by physical methods) that an alleged new compound was identical with a substance that was already well known. Even as late as the 1920s W.H. Perkin, Jr. (1860–1929), the professor of organic chemistry at Oxford, was wont to say that physical chemistry was all very well, but of course it did not apply to organic compounds; since even at that time organic compounds constituted well over 99.9 per cent of all known chemical compounds, Perkin hardly seemed to be encouraging the study of physical chemistry. And as late as 1960 I well remember being told by a distinguished chemist that the primary objective of chemistry must be the discovery of new compounds.

Gradually the opposition to physical chemistry faded away, and the subject is generally considered to be a respectable one. Research chemists of all kinds have come to recognize that their work is strengthened when they make use of the methods and conclusions of the physical chemist, and when they make some application of mathematical procedures and physical techniques.

In Table 1 I have listed what appear to me to have been the most important contributions to physical chemistry in its first half-century. It is significant that at first the subject was dominated by a few men, notably van't Hoff, Ostwald, and Arrhenius. These three men attained success in the face of initial difficulties and disappointments: van't Hoff was unemployed for a period; Ostwald had to work for a time as a schoolteacher with no facilities for research, and Arrhenius's PH.D. dissertation—on a topic for which he is now famous—was given such a low rating by his examiners that only by good fortune did he escape academic oblivion. These three men, and the others listed in Table 1, had a genius for analysing a small amount of experimental evidence, and for drawing

TABLE I
Pioneering contributions in the first half-century of physical chemistry

Year	Worker	Contribution
1887	Arrhenius	Theory of electrolytic dissociation
1887–96	van't Hoff	Theory of solutions
1887–1902	Ostwald	Elucidation of catalysis
1887–1906	van't Hoff; Ostwald	Development of chemical thermodynamics
1889	Arrhenius	Temperature dependence of reaction rates
1889	Nernst	Thermodynamics of electrochemical cells
1906	Nernst	Third law of thermodynamics
1912	Einstein	Law of photochemical equivalence
1914	Moseley	Atomic numbers
1914	Marcelin	Potential-energy surfaces for chemical reactions
1917	W.C. McC. Lewis	Collision theory of reaction rates
1918	Nernst	Elucidation of chain reactions
1921	Langmuir	Adsorption and surface reactions
1923	Debye & Hückel	Theory of strong electrolytes
1935	Eyring; Evans & M. Polanyi	Transition-state theory of chemical reactions

from it, by inductive reasoning, conclusions of far-reaching significance. Not included in Table 1 are the contributions to thermodynamics of Josiah Willard Gibbs (1839–1903). Although now recognized to be of fundamental significance, these contributions had essentially no influence on the early development of physical chemistry, partly because they were published in an obscure journal but more importantly because they were couched in obscure terminology.

By 1937, the end of the first half-century of physical chemistry, most of the general principles of the subject had become well established. A physical chemist at that time thought of the fundamental aspects of his subject in much the same way as does a physical chemist today; by contrast, a chemist in 1887 had very little understanding of general principles relating to his work. Most of what was accepted by the chemist of 1937 is still considered to be correct. What has occurred in the second half-century has been the filling-in of many details, and the making of many refinements to the earlier ideas.

Two important factors have caused the physico-chemical work of the second half-century to be of a different character from that of the first. One was the realization that the quantum theory must be taken into account in studies of chemical structure and chemical reactivity. The first suggestions that this is the case were in 1908–12 when Johannes Stark (1874–1957) and Albert Einstein (1879–1955) applied the quantum theory to a chemical reaction, in their law of photochemical equivalence. The realization that the quantum theory is

TABLE 2
Experimental techniques used by physical chemists during the second half-century

Year*	Developer	Technique	Applications to physical chemistry
1912	von Laue	X-ray diffraction	Measurement of interatomic distances
1919	Aston (following work of J.J. Thomson, 1890–1913)	Mass spectrometry	Analysis of reaction intermediates
1927	Davisson & Germer & G.P. Thomson	Electron diffraction	Measurement of interatomic distances
1928	Raman	Raman spectroscopy	Structural investigations
1940	Chance	Stopped flow	Studies of reaction mechanisms for fast reactions
1946	Purcell & Bloch	Nuclear magnetic resonance (NMR)	Structural investigations
1950–52	Porter & Norrish	Flash photolysis	Studies of reaction mechanisms for fast reactions
1954	Bull & Moon	Crossed molecular beams	Studies of reaction dynamics
1954	Eigen	Temperature jump	Studies of reaction mechanisms for fast reactions
1957	Townes	Laser spectroscopy	Structural investigations; chemical analysis
1958	Mössbauer	Mössbauer spectroscopy	Structural investigations

* The approximate year in which the technique was first used.

important in other areas of chemistry did not come until the 1920s. By 1937 the idea had at last become well established, and all later work in physical chemistry has paid attention to quantum effects.

The other important factor that influenced the work of the second half-century was the development of new experimental techniques. In 1937, when I started my research, the apparatus used was very primitive, and did not differ much from that used in the laboratories of van't Hoff and Ostwald a half-century earlier. In C.N. Hinshelwood's laboratory at Oxford, where I first worked in kinetics, the constant-temperature baths were heated by immersed light bulbs, and we had to construct our own thermostats. In a nearby laboratory, directed by D.L. Chapman (1869–1958), the students even had to make their own thermometers! This gave rise to a curious item in an article written by Chapman; according to the instructions a vessel was to be heated to 200°C, the thermometer then removed, and the heating continued for another five minutes. This vague recipe was puzzling until one learnt that Chapman's laboratory had no thermometers reading above 200°C. Perhaps the most striking example of work done with simple equipment was that of Fräulein

Agnes Pockels (1862–1935), whose still-quoted investigations of surface tension were carried out literally at her kitchen sink, with utensils that were either domestic or home-made.

In Table 2 I have listed some of the experimental techniques that have been widely used by physical chemists during the second half-century. I have not included ordinary spectroscopy, which has been used for three hundred years, and which has been widely employed, even in routine work, during more recent years. Nor have I included computers, now used very extensively. When I started my research we did all our calculations on a slide rule, which was as effective as the crude mechanical calculators then available. Now all science students at universities have hand calculators that are more efficient than the enormous computers used forty years ago. The widespread use of computers in modern research is, of course, not always advantageous. Whereas the early workers drew shrewd conclusions from a small amount of evidence, some modern researchers carry out a vast number of experiments and rely too much on the computer to sort everything out. The computer is only an asset if it is used not as a replacement for thought, but to carry out calculations more rapidly than is otherwise possible.

Although the earlier investigators made many important advances in a barren field of endeavour, they were severely handicapped by the lack of experimental techniques. Ostwald, for example, worked assiduously on the problem of catalysis and made many important clarifications. In the end, however, he realized himself that he had been unsuccessful in proposing a specific mechanism for any catalyzed reaction. We now realize that with the techniques available to him he could not possibly have done so. Catalyzed reactions involve the participation, as reaction intermediates, of unstable species often having lifetimes of much less than a second, and present in very small amounts. In Ostwald's time there was no way that these intermediates could have been detected or identified.

Modern spectroscopic techniques have been particularly valuable for the detection of reaction intermediates of very short lifetimes. One of the many important contributions made by Gerhard Herzberg has been his detection, by spectroscopic techniques, of certain intermediates that occur in reacting chemical systems. In 1980 John Polanyi and his co-workers at the University of Toronto made a very important advance when they were able to detect, by spectroscopy, transition species that are formed during an elementary chemical event. Polanyi has also probed the detailed course of a number of chemical processes, in a way that would have been quite impossible during the earlier period because of the lack of experimental procedures.

The second half-century of physical chemistry has thus been a period of consolidation, in which previously formulated general principles have been elucidated and established in much more detail. The new approach has involved a great change in the facilities and financing of research in physical chemistry. In the first half-century much of the work was done with a few beakers,

burettes, a pocket watch, and some inexpensive chemicals; the scientist frequently paid for these himself or obtained them from an undergraduate teaching laboratory.

Today all is changed. There is some modern research in physical chemistry that can be done with modest equipment, but a scientist whose resources are very small is greatly limited as to accomplishments. For effective work a scientist needs to be able to explore a number of avenues, and therefore should be adequately provided with research funds—a fact that governments often fail to understand.

The cost of research depends to a great extent on the area of research. There is a curious tendency today for scientists to rate one another in terms of the size of their research grants; this evaluation could only be valid if all research cost the same and if granting agencies were omniscient. In the rating of a scientist the money provided should surely be somewhere in the denominator rather than the numerator, which should involve the quality of the work. The latter, however, is extremely difficult to assess. Anyone who looks into the history of science can find many instances of work, neglected in its time, which eventually proved to be of lasting importance. This is another lesson that governments need to learn.

Biographical Sketches of Deceased Fellows
Notices nécrologiques des membres décédés

JACK DAINTY, F.R.S.C.

Marvin William Bannan
1908–1986

TRANSACTIONS OF THE ROYAL SOCIETY OF CANADA / SERIES V / VOLUME II / 1987

MARVIN BANNAN was born on 23 March, 1908, in Parry Sound, Ontario. It was there, on the shores of Georgian Bay (Lake Huron), that he grew up and received his primary and secondary education. He and his parents moved to Toronto in 1925, the same year in which Marvin became an undergraduate at the University of Toronto, where he was destined to spend his entire professional life. Having received his B.A. in 1929, he enrolled in the University's graduate school and in 1933, on receiving his PH.D., was given a teaching appointment in the Department of Botany there. Starting his academic career as a demonstrator, he rose through the ranks to become a full professor and associate chairman of the department. Unfortunately, deteriorating vision caused him to take early retirement in 1970, but he continued to live in Toronto and maintain his faculty associations until his death on 19 January, 1986.

Dr. Bannan was an outstanding plant anatomist, concentrating his efforts on improving our knowledge of the structure and formation of the wood of conifers. He developed a technique essential for understanding the developmental changes which take place in the vascular cambium, the meristematic tissue that produces the wood and bark of all trees. This technique involves the microscopic analysis of serial sections through the vascular cambium and the wood formed by it. By identifying a particular initial cell and the derivative cells produced by its divisions, it is possible to reconstruct the pattern of cell divisions and cell growth in a single cell lineage over a number of years. The recognition of cell lineages has become an important tool for development biologists in the 1980s, and Marvin Bannan's findings predated this work (now known as clonal analysis) by twenty-five years.

During his career, he applied this technique to about 15 conifer species and analysed at least 45,000 cell lineages. A number of important findings resulted from this detailed documentation. He established that, because of the nature of cellular changes associated with radial growth of woody trees, there is a negative relationship between radial growth rate and cell length. He determined the relationship between the production and death of new initial cells at the end of the growing season and, importantly, was able to predict which daughter cells were most likely to survive. He also demonstrated the developmental mechanism producing spiral grain in conifer woods. By comparing these features within individual trees and among trees from different parts of their geographical range, he was able to make predictions about the environmental and genetic components of the observed variation. A knowledge of these developmental characteristics has also led to an understanding of the function of many structural features of mature wood.

These principles have important implications for forest management and tree breeding. Most significant is the demonstration that trees growing with a radial growth rate of 1–2 mm. per year will have the longest fibre cells, with cell length tapering off at higher and lower annual growth rates.

His work was so basic and so meticulously carried out that, although he was a very quiet and retiring man, sitting in his laboratory in Toronto, it influenced

the work of many other distinguished plant anatomists. The technique of analysing radial files of cells to deduce cell behaviour in previous growing seasons has had a wide impact on other plant anatomists. Esau (U.S.A.) and Evert (U.S.A.) have applied this technique to formation of the phloem in the bark tissues, and Barghorn (U.S.A.), Cumbie (U.S.A.), Hejnowicz (Poland), and Gouse (India) have extended Bannan's observations to the wood of other conifers and of dicot species.

Marvin Bannan published about fifty papers, almost all of them as the sole author, between 1933 and 1970. This steady, quiet production of definitive papers at a rate of one or two per year seems very characteristic of Marvin Bannan. Many continue to be widely cited in both research papers on the subject and in textbooks. They not only have solid scientific content, but are considered to be models of scientific writing. As is appropriate for work on the structure of softwoods which are so important to the Canadian economy, most of his work was published in the *Canadian Journal of Botany*.

Marvin Bannan's major contributions to botanical research in Canada were recognized by his election to the Fellowship of the Royal Society in 1952. He was also honoured in 1973 by the award of the George Lawson Medal of the Canadian Botanical Society. In presenting the medal, Dr. Taylor Steeves, then President of the C.B.A., said of his work, "These papers are internationally respected not only for their solid scientific contributions to knowledge of the ways in which gymnosperms grow, but as models of succinct scientific writing. No one else has contributed so much to our knowledge of the way in which new wood and bark are formed in softwood trees."

As in his research, so in his teaching he was extremely painstaking and meticulous. Many generations of University of Toronto botany students have him to thank for a sound training in the anatomy and morphology of plants and the manifestations of evolution. He kept alive the study of plant anatomy, morphology, and paleobotany during these times when they are not "fashionable." He was never deflected from his faith in the value of knowing how plants are constructed, how they develop, and how they are interrelated, and many people now engaged in working with plants in diverse ways have benefited from this faith.

He was a quiet, retiring, modest, and kind man as well as a thoughtful and dedicated scholar. He influenced many, both by his kindness and by his work. This work, definitive as it is, will long stand as a memorial to him.

MICHEL CHRÉTIEN, S.R.C.

André Barbeau
1931–1986

MÉMOIRES DE LA SOCIÉTÉ ROYALE DU CANADA / CINQUIÈME SÉRIE / TOME II / 1987

NOUS PLEURONS le départ prématuré du Docteur André Barbeau. Même s'il nous a quitté physiquement, son esprit reste et restera avec nous, car André Barbeau, tant par sa personnalité que par son œuvre, est un être *inoubliable*.

Comment oublier ce personnage qui s'est dépensé sans compter pour la juste cause, dont la renommée scientifique dépasse largement nos frontières et que le courage a fait vivre et produire jusqu'au dernier instant.

Nous nous souviendrons de sa grande compassion et de son dévouement indéfectible auprès des malades accablés par ces neuropathies débilitantes dont il essayait d'identifier la cause. Même dans les circonstances les plus difficiles, la porte de son bureau restait toujours ouverte pour accueillir et aider ces êtres souffrants qui lui demandaient secours.

Nous nous souviendrons de son ardeur, de sa persévérance et de son exceptionnelle motivation qui en ont fait le défenseur des causes les plus difficiles, le héros des désespérés et le porte-étendard de nombreuses délégations.

Comment peut-on oublier les grandes étapes de sa fructueuse carrière scientifique qui ont fait sa renommée, aussi bien que celle de ses collègues et celle de son milieu. Ses travaux d'envergure ont élargi le cadre de nos connaissances scientifiques et fait reculer les frontières de la neurologie classique. Son approche originale et inédite à l'étude de la maladie de Parkinson, de l'ataxie de Friedreich et de bien d'autres problèmes de neurogénétique, aussi bien que ses découvertes sur la physiopathologie et le traitement de ces maladies témoignent bien de son esprit inventif, de sa largeur de vue et de la profondeur de sa compétence de chercheur-clinicien.

Nous nous souviendrons aussi de lui comme la forte et sereine moitié d'un couple uni, d'un couple modèle, d'un couple admirable. C'était un père de famille exemplaire qui avait si bien su choisir la mère de ses enfants. C'était aussi un ami dont il faisait bon partager la joie de vivre, l'enthousiasme et l'élan.

Nous n'oublierons pas son ardeur à défendre ses idées et la force de son verbe qui savait être aussi bien logique et tranchant que séducteur et poétique. Ce fut, dans notre milieu, l'un des écrivains scientifiques les plus prolifiques de notre temps. Son accession récente à l'Académie canadienne française a rendu hommage à son talent littéraire exceptionnel.

Le message qu'il nous a transmis lors de son discours de réception à l'Académie, venait du fond du cœur ; c'était en quelque sorte son testament spirituel. J'aimerais vous citer quelques extraits qui s'adressent plus particulièrement aux jeunes médecins et aux autres membres de sa profession.

Le jeune médecin devrait être forcé dès le début de sa carrière d'aller quérir son bien où il se trouve, de communier en quelque sorte avec tout l'univers dans l'orbite de ses préoccupations spéciales. En d'autres termes, ce par quoi le médecin véritable se distingue du charlatan, de l'officier de santé supérieur, du technicien pur, ce en quoi il se spécifie pour ainsi dire, c'est précisément dans cette alerte incessante de l'esprit, dans

cette préoccupation vigilante de tout savoir de son métier, dans cette quasi-nécessité d'être une voile sensible à tous les vents des constatations et des découvertes nouvelles, car chacune est susceptible de guider son diagnostic et sa thérapeutique. Chacune peut éventuellement lui permettre de mieux comprendre et de mieux agir au bénéfice de son patient d'abord, de la société ensuite.

Le chercheur clinicien neurologue est donc avant tout un médecin, avec ses trois sagesses : celle de son métier, de sa culture générale, de sa philosophie de la vie . . . . Trois sagesses dont la proportion relative, pour un individu donné, est extrêmement variable. Le médecin, pas plus que l'avocat, le sociologue, le prêtre, pas plus que l'homme de la rue, n'échappe à la loi de la synthèse personnelle . . . . A l'arrière-plan de toutes ses pensées, de toutes ses actions, il y a toute sa personne. Dans son geste médical il y a, conscientes ou non d'elles-mêmes, toute sa culture générale, toute sa philosophie de la vie. Et cela n'est pas absolument indifférent pour le malade qui, lui aussi, en plus de sa maladie, possède sa culture générale et sa conception de l'existence humaine.

André Barbeau était un être sensible et attentif, à la fois rêveur et pragmatique, spontané tout en étant très ordonné et systématique. Il a laissé dans son sillage de nombreuses réalisations qui continueront d'édifier les générations à venir. Lui-même avait suivi les traces de son père, Antonio Barbeau, autre neurologue de grande réputation et dont les hauts faits restent aussi mémorables. L'un des biographes du Docteur Antonio Barbeau avait écrit en 1947 dans un numéro spécial du journal de l'Hôtel-Dieu de Montréal, dédié à sa mémoire : « Antonio Barbeau voulait une médecine canadienne-française ayant ses caractères propres, s'édifiant sur l'esprit et la culture de la clinique française, tout en s'incorporant la meilleure des techniques anglo-saxonnes. Il se complaisait à ce rêve d'une médecine canadienne-française autonome, indépendante de l'étranger et capable de conquérir des trophées dans l'invention de la découverte. »

Son fils, André, a réussi à concrétiser ce rêve paternel par ses contributions scientifiques majeures au domaine de la neurobiologie. André Barbeau a vécu avec une intensité peu commune. Il travaillait avec une ardeur exceptionnelle et une passion débordante. Il avait l'âme du poète et la créativité des grands bâtisseurs. Il nous laisse un grand héritage d'humanisme, de courage, de créativité scientifique et d'amour du prochain.

Je vous demande de vous recueillir et de méditer sur ces mots qu'il a lui-même écrit en août 1984 :

- Pendant la vie toujours pouvoir
  1 Rêver
  2 Aimer
  3 S'émerveiller
- À la fin . . .
  S'éteindre en écoutant l'hymne à la joie

DIGBY J. McLAREN, F.R.S.C.

Helen Belyea
1913–1986

TRANSACTIONS OF THE ROYAL SOCIETY OF CANADA / SERIES V / VOLUME II / 1987

HELEN REYNOLDS BELYEA, who had been associated with the Geological Survey of Canada for forty-one years, died in Calgary on 20 May, 1986, at the age of seventy-three years. Born in St. John, New Brunswick, on 11 February, 1913, from United Empire Loyalist stock of French Huguenot origin, she received her early education in St. John, her B.A. and M.A. in geology from Dalhousie University, and her Ph.D. from Northwestern University with a thesis on "The Geology of Musquach Area, New Brunswick." She began World War II as a high school teacher and ended as a lieutenant in the navy's WRCNS. In 1945 she joined the Geological Survey of Canada as a sub-surface stratigrapher.

The discovery of oil in Devonian rocks at Leduc, Alberta, in 1947 sparked a decision by the Geological Survey to establish an office in western Canada, and in 1950 the Calgary office was opened; the first geologists were R.T.D. Wickenden and Helen Belyea. This small beginning led eventually to the formation of the Institute of Sedimentary and Petroleum Geology, which was opened in 1967. Although described as a sub-surface geologist, Dr. Belyea developed, in fact, into a field geologist of considerable ability and looked at rocks wherever she could find them, from the tops of mountains to the bottoms of oil wells. As a result of Leduc, she began work on the rocks in which the discovery was made–the Devonian System. She spent her life explaining and synthesizing knowledge of these important and difficult rocks over the vast region of the western sedimentary basin from the Montana border to the Mackenzie River country, and from the Canadian Shield to the Rocky Mountain Trench. In the early 1950s her concepts were few. Little was known about limestones, and less about the detailed structure of reefs and their disposition and relations with adjoining sedimentary basins. Through the 1950s and 1960s concepts changed and interpretation was built on evidence from increased drilling activity as well as increased field work. It was in this environment that Helen undertook the unending task of trying to put sense into the Devonian of the Western Plains.

In her first paper, "Notes on the Devonian System of the North Central Plains of Alberta" (1952), she plunged straight into the maelstrom of trying to understand the facies relations in the upper Devonian and the meaning of the reef-off reef sequences. This was followed in 1955 by another important paper on "Cross-sections through the Devonian System of the Alberta Plains," which outlined the southern margin of the reef complexes and began what was almost a lifetime wrestle with the problems of relationships in the upper part of the succession, above the Woodbend reefs and biostromes. The reef pattern was becoming known, and in this paper she brought together much information. In all this she rapidly won the support and approval of her colleagues in industry, and indeed, they were well served.

In the late 1950s the Geological Survey was mapping in the southern Northwest Territories from Buffalo River south of Great Slave Lake westwards

to the mountains beyond Liard River and northward to Wrigley on the Mackenzie River. This necessitated accurate and painstaking stratigraphic work involving the correlation between outcrop and sub-surface. Helen Belyea played an important role in the development of the stratigraphic framework of the area west from Hay River south of the Mackenzie. Her accurate and painstaking work on material obtained from the relatively few wells drilled in that region, coupled with her broad knowledge of regional geology, produced a synthesis and terminology for the Devonian rocks of the region, which still stand. Major recognition came in the early 1960s when she was asked to make a contribution to the volume on the "Geological History of Western Canada," widely known as "The Atlas." She took the responsibility for the whole of the Upper Devonian, and published maps and sections of various kinds, as well as a detailed and authoritative text for the whole western basin. Further recognition came in the First International Devonian Symposium which was sponsored by the Alberta Society of Petroleum Geologists in 1967. This symposium attracted Devonian workers from all over the world and coincided with the official opening of the Institute of Sedimentary and Petroleum Geology, when the Calgary office of the Geological Survey at last moved to its splendid new quarters. In 1971, Dr. Belyea published one of her most important studies: the "Middle Devonian Tectonic History of the Tathlina Uplift, Southern District of Mackenzie and Northern Alberta." This complex and authoritative work laid the foundation for considerable exploration activity over the years that followed. She kept up a steady output of authoritative and meticulously prepared reports based on the interpretation of huge amounts of data from the sub-surface and from her own field work. Although officially retired in 1975, she continued to work as a Research Scientist emeritus at ISPG until the onset of her final illness.

Helen Belyea began to work in Alberta when the petroleum industry was a man's world. But this small determined woman, with a daunting intellect, who never suffered fools gladly, was quickly accepted as a valued colleague, as well as being admired and loved as a warm, humorous, and generous friend. Helen was a "woman of parts"; her circle of friends was far wider than the geological profession. She was an athlete who enjoyed mountaineering, walking, skiing, swimming, and was an able equestrian and lover of pack-horse journeys. She travelled widely as a geologist and as an interested traveller and lectured in France, which she loved, and other countries of Europe. She was interested in the arts and music, a member of the Calgary Philharmonic Orchestra League and an Associate Director of the Calgary Zoological Society. I collaborated with her over many years in the field and in the laboratory, quarrelled with her on mountainsides, argued with her over stratigraphic correlations, and published several papers jointly with her. There are many like me who miss her sorely and who honour the memory of a brave and determined human being.

During her lifetime Helen Belyea received many honours that acknowledged

her contributions to Canada and to Canadian geology. She was elected a Fellow of the Royal Society of Canada in 1964 and was made an Honorary Member of the Canadian Society of Petroleum Geologists. In 1956 she was awarded the Barlow Memorial Medal by the Canadian Institute of Mining and Metallurgy. She received honorary degrees from Windsor and Dalhousie universities and in 1976 was named an Officer of the Order of Canada.

JEAN DAVID

Robert Haddon Common 1907–1986

TRANSACTIONS OF THE ROYAL SOCIETY OF CANADA / SERIES V / VOLUME II / 1987

ROBERT HADDON COMMON passed away on 27 June, 1986. Born in Larne, Northern Ireland, on 25 February, 1907, this prodigious scholar received his B.SC., B.AGR., and M.AGR. from the Queen's University of Belfast. As an external student of the University of London, he was awarded a B.SC. in Organic Chemistry, Botany and Zoology, and a PH.D. in Biochemistry.

Dr. Common possessed a rare breadth of knowledge and interests. Prior to his arrival in Canada, he was Scientific Officer for the Ministry of Agriculture for Northern Ireland, and Lecturer in the Department of Agricultural Chemistry, Queen's University. He was engaged in research on the chemistry of grass silage, the digestibility and nutritional value of hay, and by-products of flax and grass. He also conducted field fertilizer trials, and his early interest in soil science led to the publication of probably the first description of a podsol in Ireland.

In 1947 Haddon Common joined the Faculty of Agriculture, Macdonald College of McGill University, as Professor and Chairman of the Department of Agricultural Chemistry, positions he held with distinction until his retirement in 1972. He continued on a part-time appointment until 1975.

His initial research at Macdonald College was directed toward the nature of the toxic products formed when unsaturated oils are heated at polymerization temperatures. The results of this research, at first questioned, were completely confirmed and extended in industrial laboratories. In later years, he became interested in avian biochemistry and a major portion of his published work is related to his pioneering studies on the nature and metabolism of the steroid estrogens of the hen. This work has received international recognition as the most significant and exhaustive study on the subject. During that time at Macdonald, forty-nine graduate students came under his direction. It can be said that his greatest achievement was a profound and lasting impact on the professional and intellectual development of students and colleagues alike.

Haddon Common held several important positions in the Agricultural Institute of Canada, was President of the Nutrition Society of Canada and President of the McGill Association of University Teachers. His achievements were widely recognized and he received many deserved honours, including a D.SC. degree from the University of London and an honorary LL.D. degree from Queen's University of Belfast, his alma mater. He was elected Fellow of the Royal Institute of Chemistry of Great Britain and Northern Ireland, Fellow of the Chemical Institute of Canada, Fellow of the Agricultural Institute of Canada, and Fellow of the Royal Society of Canada, and was awarded the Confederation Medal. In 1975, he was honoured by the Nutrition Society of Canada as the recipient of the E.W. McHenry Award and by McGill University with an emeritus professorship.

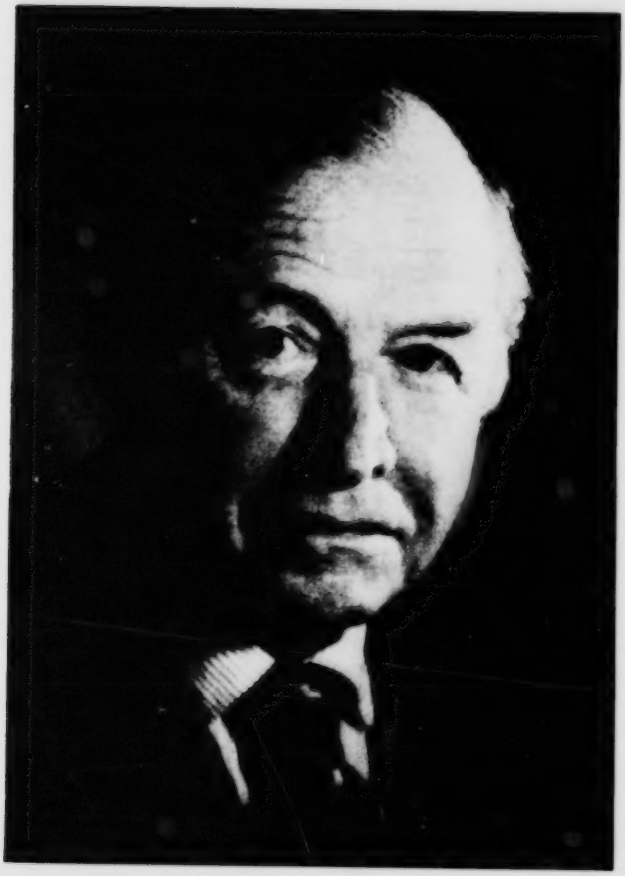
Professor Common is remembered not only as an outstanding scientist but also as a man of erudition who was very much at ease in history, geography, art, and literature. He quoted frequently from his many readings of English,

German, and French poets and authors. Also, his considerable repertoire of limericks has delighted many staff and students alike. Robert Haddon Common was a compleat man.

Dr. Common is survived by Renate, his wife and devoted partner of fifty-one years, four daughters—Edith, Sonia, Christine, and Jennifer—and two sons—Robert and Andrew.

IAN S. THOMPSON, CHARLES MICHENER,
AND JAMES BOOTH

Duncan Ramsay Derry
1906–1987



TRANSACTIONS OF THE ROYAL SOCIETY OF CANADA / SERIES V / VOLUME II / 1987

DUNCAN DERRY, an accomplished theoretical and practical geologist, passed away on 26 January, 1987, in his eighty-first year. Elected a Fellow of the Royal Society of Canada in 1946, Duncan Derry's professional career spanned a sixty-year period.

Born in England in 1906, he graduated from Cambridge in Honours Science in 1927. He came to Canada immediately thereafter and enrolled in the Department of Geology at the University of Toronto, where he obtained his M.A. in 1928 and his PH.D. in 1931, following which he lectured for four years.

In 1935 he joined Ventures Limited, a predecessor company of Falconbridge Limited, as a staff geologist, and he remained there until 1954, rising to Chief Geologist during a remarkable period of expansion for that company. His career was interrupted by four years of war service as a navigation instructor in the RCAF, from which he retired with the rank of Squadron Leader. In 1954 Dr. Derry moved from Ventures to assume the Presidency of Rio-Canex, the Canadian exploration arm for the London-based Rio Tinto Company Limited, and he was closely involved in the development of a group of uranium mines in the Elliot Lake–Blind River district of Ontario.

Dr. Derry's earliest connection with the Royal Society was in 1931, when he presented a paper to the Geological Branch of the Society at the University of Toronto. He recently wrote of that occasion, "I can still remember the discussion that followed in which T.C. Quirke, a well-known and very articulate geologist, suggested that my cross-sections should be turned upside down. It was remarkable that a group of qualified geologists would listen to a naïve little paper, but in the absence of a Geological Association of Canada or even a geological division of the Canadian Institute of Mining and Metallurgy, the Royal Society played the part of encouraging scientific papers in each branch and those meetings had more open and frank discussions than I can remember anywhere since."

After the war, the rapid dissemination of scientific knowledge and the expansion of the Canadian mineral industry encouraged a small group of geologists, including Dr. Derry, to found the Geological Association of Canada in 1947. He became the GAC's fourth president in 1953 and served again in 1971, its twenty-fifth anniversary year.

During the late 1950s Dr. Derry chaired a joint committee of the Royal Society and the Alberta Society of Petroleum Geologists which recommended to the Diefenbaker government the enlargement of the Geological Survey of Canada in order to improve the geological database, increase activity of the northern and sub-Arctic region, and provide work for a great number of unemployed geologists at that time. Dr. Derry presented the committee's brief to the Cabinet; the proposals were accepted and allowed for rapid expansion of the Survey's activities. It is appropriate to note his recent observation that if the Royal Society is to be effective in influencing government policy, it needs to maintain a greater proportion of non-academic Fellows.

In 1950 Dr. Derry was instrumental with J. Tuzo Wilson and others in the

compilation of the Tectonic Map of Canada, the first attempt to synthesize data from government, university, and industry sources. Dr. Derry also published many geological papers and was active in professional societies including the internationally renowned Society of Economic Geologists. In 1960 he became its first non-American president, and in 1973 was its distinguished lecturer. This society has posthumously awarded him the highest recognition it can bestow on a member, the Penrose Medal.

In 1960 Dr. Derry left Rio Tinto to become a private geological consultant. What was originally a one-man practice continues to this day, but has expanded to a partnership with about twenty-five geologists and engineers and a prominent Canadian and international client-base and reputation.

Duncan Derry was throughout his career a highly disciplined scientist and a prodigious worker. He travelled constantly, and his international experience was the inspiration for his major publication, *A Concise World Atlas of Geology and Mineral Deposits*, published in 1980 by the Mining Journal Books Limited of London, England. It was a significant achievement, compiled and written at an age when most men have retired.

Dr. Derry was a remarkable man in that he combined the best of the practical and the theoretical aspects of geology and, in particular, maintained close links with numerous educational institutions and groups throughout his career. He was instrumental in the launching of the Canadian Geological Foundation in 1968 and in arranging for its initial financing. He also participated in the founding of the Canadian Geoscience Council. He played a role in the growth and development of the Departments of Geology in the University of Toronto, Queen's University, the University of Western Ontario, Harvard, and Princeton, through serving on their advisory committees. He was chairman of the University of Toronto advisory committee from 1974 to 1978.

His accomplishments are reflected in the honours he received. The Canadian Institute of Mining and Metallurgy awarded him the Blaylock Medal in 1974, and the Institute of Mining and Metallurgy in London, England, awarded him its Gold Medal in 1976. The Geological Association of Canada awarded him its Logan Medal in 1970 and in 1979 the Mineral Deposits Division of the GAC struck the Duncan R. Derry Medal to recognize those who have made major contributions to the science of economic geology in Canada. The Derry Laboratory, named in his honour, was established in 1984 as a graduate research unit of the Ottawa–Carleton Centre for Geoscience Studies. Dr. Derry's appointment as an Officer of the Order of Canada in 1981 was received with a great sense of pride and appreciation by geoscientists at home and abroad as it reflected the importance of the science of geology to the development of this country.

Duncan Derry played a commanding role in Canadian geoscience. He was truly unselfish of his time and energy and contributed greatly to the standards of professionalism in geology and to the status and appreciation of the earth sciences in Canada.

GUY SYLVESTRE, S.R.C.

Roger Duhamel
1916–1985

MÉMOIRES DE LA SOCIÉTÉ ROYALE DU CANADA / CINQUIÈME SÉRIE / TOME II / 1987

ROGER DUHAMEL fut un des meilleurs journalistes canadiens de sa génération, un grand vulgarisateur, un irrépressible communicateur. Ayant aquis au cours des ans une vaste culture, grand lecteur jusqu'à la fin, curieux de tout (sauf, sans doute, des sciences exactes devenues de moins en moins accessibles aux non-initiés), son attention était simultanément sollicitée et retenue par l'événement du jour et par le passé sur lequel il ne cessa jamais de se pencher, comme elle l'était par la politique et par la littérature (si souvent antinomiques pour les gens de sa génération, la mienne). Avec la plus grande facilité, il cumulait volontiers au même journal les fonctions de directeur ou de rédacteur en chef et celles de critique littéraire, trouvant le plus naturel du monde de commenter la réélection du gouvernement Duplessis et la publication d'*Au pied de la pente douce*, l'une et l'autre faisant partie du tissu dont est faite la vie quotidienne.

Ses autres activités, nombreuses et diverses, étaient en quelque sorte le prolongement de l'une ou de l'autre facette de sa carrière de journaliste, celle qui lui tint le plus à cœur et dont il se sentait le plus privé lorsque la vie l'appela à d'autres fonctions. Le journaliste politique fut candidat du Bloc populaire aux élections législatives du Québec en 1944 (et défait) ; celui qui, au sortir de la faculté de droit, avait été secrétaire particulier du maire Camilien Houde de Montréal, poursuivit son action nationaliste comme président de la Société Saint-Jean Baptiste de Montréal, avant de devenir plus tard membre du Bureau des gouverneurs de la Radiodiffusion, Imprimeur de la Reine et Ambassadeur du Canada au Portugal.

D'autre part, le critique littéraire fut aussi professeur de littérature à l'Université de Montréal, président de la Société des écrivains canadiens, membre de la Société Royale du Canada et de l'Académie canadienne-française (dont il fut président de 1979 à 1981) et, rentré à Montréal en fin de carrière, directeur des Éditions La Presse (et heureux de pouvoir revenir à ses premières amours de la presse écrite et parlée). Il fut aussi actif dans divers autres sociétés et mouvements culturels, éducatifs et nationalistes: vice-président du Comité de la Survivance française en Amérique, président du conseil du Lycée Claudel d'Ottawa, président de l'Alliance française à Ottawa et à Montréal. Il est intéressant de noter que, président de la Société Saint-Jean Baptiste de Montréal, il trouva l'occasion de réconcilier ses deux amours (la politique nationaliste et les lettres) en fondant le Prix Duvernay (qui lui sera attribué en 1962). Longtemps membre du jury de ce prix avec lui, je puis témoigner qu'il fut toujours opposé à l'octroi de ce prix à de médiocres auteurs nationalistes de préférence à de bons écrivains qui ne l'étaient pas, ou peu : un prix littéraire était un prix littéraire.

Cette carrière longue et remarquée, à première vue diverse et même dispersée (il passa plusieurs fois d'un journal à un autre, le candidat du Bloc populaire fut Ambassadeur du Canada !) fut néanmoins, malgré les apparences, d'une réelle continuité : dans ses diverses incarnations, l'auteur des *Lettres à une provinciale* resta toute sa vie fidèle aux valeurs traditionnelles dont il se fit

toujours le défenseur. Toute sa vie durant, il resta attaché au courant nationaliste québécois et aux idées conservatrices (de ce point de vue il était en pays ami chez Salazar). Son attachement au passé était nourri par une étude constante de l'histoire, et singulièrement par celle des institutions monarchiques (*Histoires galantes des reines de France, l'Internationale des rois*). S'il fut président du conseil du Lycée Claudel, c'est Maurras qui avait son cœur. Claudel n'était d'ailleurs pas de sa famille, les siens étant plutôt du côté de la modération et de la clarté. De ce point de vue, il était nettement du côté de la tradition dominante française et, lorsqu'il a réuni en volume des textes choisis des *Moralistes français*, il est significatif que le livre débute par le texte bien connu de Montaigne sur *la modération* et qu'il se termine par des textes de Joubert dont Duhamel souligne « la délicatesse des sentiments ».

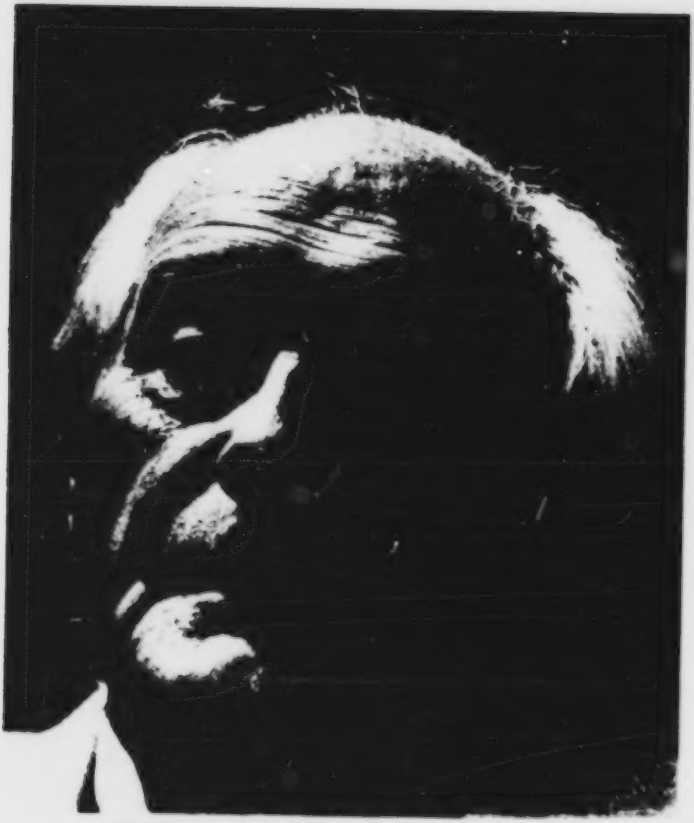
Cet homme modéré, ennemi des extrêmes, a d'ailleurs donné à ses recueils d'articles choisis des titres dont il faut souligner l'humilité et la simplicité : *Littérature, L'Air du temps, Bilan provisoire* (j'ai déjà mentionné les *Lettres à une provinciale*). Quand on relit aujourd'hui ces chroniques des lettres françaises ou canadiennes (avec quelques excursions en terres étrangères), on est une fois de plus frappé par la modération qu'il manifestait dans ses jugements, non qu'il ignorât les faiblesses des œuvres qu'il commentait, mais il préférait rappeler la grandeur des géants, la pensée et l'art d'écrire des écrivains majeurs, les promesses de ceux qui manifestaient des dons réels. La littérature était pour lui un lieu privilégié, les écrivains constituaient une famille dont les membres se devaient d'être solidaires et cette camaraderie se retrouvait autant dans son œuvre écrite que dans ses rapports avec ses collègues de la Société des écrivains comme des académies dont il était membre. S'il manifestait une juste répugnance pour la grossièreté ou la bêtise, il avait un respect (qui pouvait atteindre l'admiration) pour l'écrivain et son œuvre: la littérature était pour lui une manifestation de la dignité de l'homme, ses manifestations pouvant être les plus diverses et méritant, les unes et les autres, notre meilleure attention ; s'il avait ses préférences et ses idées propres, Roger Duhamel fit toujours preuve d'une grande largeur d'esprit dans l'évaluation des œuvres qui retenaient son attention et, en dehors de tout dogmatisme, cherchait à rendre justice aux mérites de celles qui lui étaient étrangères. Ses préférences ne le conduisaient pas à des exclusions injustes, il trouvait à droite et à gauche (mais plus souvent à droite qu'à gauche) des nourritures valables, au moins partiellement digestibles pour le lecteur jamais rassasié qu'il fut toujours.

Ce qui lui répugnait le plus, c'était la grossièreté (une certaine littérature québécoise du milieu du siècle n'en manquait pas), à moins que ce n'ait été la bêtise. La littérature se devait d'être à ses yeux une affaire de commerce entre honnêtes gens, commerce qu'il préférait lorsqu'il transigeait des idées élevées exprimées dans une langue claire et des sentiments également élevés exprimées avec modération, sinon avec pudeur. Il avait retenu ce mot de Joubert : « la modération consiste à être ému comme des anges », et son œuvre de critique fut toujours un effort pour élucider les idées centrales d'une œuvre ou d'un

écrivain, souligner les caractéristiques principales d'un style, cerner les problèmes soulevés par l'une ou l'autre, et communiquer à son lecteur dans une langue claire les lignes de force et les faiblesses d'un ouvrage récent ou ancien. Cet observateur de la vie politique contemporaine et d'une littérature séculaire ou en voie de naître ne cessa jamais de se pencher sur le passé et l'auteur des ouvrages historiques mentionnés plus haut évoqua également les *Sources du romantisme* et reprit à son compte et au nôtre la *Lecture de Montaigne*. Il faut noter que cet homme qui était attaché à l'Église (entendez l'Église catholique romaine de longue tradition) et aux institutions monarchiques était aussi attaché par tempérament à des écrivains sceptiques—Montaigne était à ses yeux l'incarnation même de la sagesse—et sa répugnance pour les extrêmes ou, si l'on préfère, son goût du juste milieu l'empêcha toujours d'être un critique dogmatique, jugeant les œuvres d'après des règles ou des canons fixes; il était, au contraire, comme l'abeille qui fait son miel à même le suc des fleurs les plus diverses. Ce professionnel des lettres avait gardé les qualités de l'amateur—de celui qui aime—et il aura beaucoup fait pour faire aimer des autres les meilleures des nombreuses œuvres qu'il a fréquentées et parfois habitées.

WILLIAM BLISSETT, F.R.S.C.

Barker Fairley
1887–1986



Photograph by Kenneth Quinn. Courtesy of University College Archives

TRANSACTIONS OF THE ROYAL SOCIETY OF CANADA / SERIES V / VOLUME II / 1987

BARKER FAIRLEY, who died on 11 October, 1986, in his hundredth year, was born in Barnsley, Yorkshire, on 21 May, 1887, the son of an elementary schoolmaster, and was educated in the local grammar school and at the University of Leeds. His English, both spoken and written, was of singular purity, directness, and strength: while not a regional or a class or an academic dialect, it was northern—as an oak tree might speak or write, or a trim but sturdy sailing vessel. The Scottish poet Hugh MacDiarmid, who listed as his hobby "hating the English," never included his staunch friend Barker Fairley in that category. This northernness made the more full and ready his assimilation to Canada.

He first learned German in his lunch periods at school and then studied modern languages in university. His doctoral work was done in German at the University of Jena, where he supported himself as Lektor in English from 1907 to 1910. A few very old people in nearby Weimar might have seen Goethe; Nietzsche had died there only a few years before, and the young graduate student met his sister and his doctor, assessing the former as a "goose" and noting with literary agreement the medical opinion of the latter that the first symptoms of the philosopher's madness appear in *Zarathustra*.

While still in Jena he was personally recruited for the new University of Alberta; he served there from 1910 to 1915, teaching in temporary quarters in a down-town office building. While there he met and married Margaret Keeling of the Department of English, also from Yorkshire. Margaret Fairley, who was active in left-wing politics and cultural life, died in 1968. Of their five children one survives, Dean Anne Schabas of the Faculty of Library and Information Science, University of Toronto.

A scholar from Germany had been prevented by the outbreak of the Great War and his subsequent death in action from coming to the University of Toronto to take up an appointment in University College, and so Barker Fairley came as Associate Professor in 1915. Made Professor in 1926, he remained until 1932, when he resigned to take the chair in German at the University of Manchester. Four years later he returned to Toronto as head of the Department of German, from 1936 until his retirement in 1956; one further year he served as a Special Lecturer. He taught every year from 1907 to 1957 without leave of absence: he never thought of a university as a place to go away from in order to do academic work or live the life of the mind.

Barker Fairley wrote his doctoral thesis on a mediaeval subject, a comparative study of a German and a French version of the Romance of Aeneas. Explaining this choice, he would say: "It hadn't been done before; I could do it in the time allotted; I could do a competent job that would not need to be repeated—and then I would be free to do only what interested me." What interested him most during his first Toronto period was English literature and the burgeoning Canadian culture—so much so that he discussed with W.J. Alexander the possibility of joining his Department of English. He knew Wordsworth well, and Hardy, and was an early and lifelong admirer of Edward

Thomas, but it was Charles Doughty he always meant when he referred to "my poet." Already a devoted reader of *Arabia Deserta*, *Adam Cast Forth*, and the other shorter poems, but most especially of the tremendous epic poem *The Dawn in Britain*, he found when Doughty died in 1926 that he could not rest until he had written a book in exposition, criticism, and tribute. During that summer he drafted a chapter a week, revised the manuscript and sent it off. Published in 1927, it is still the best introduction to Doughty, especially when supplemented by his half-dozen later articles on the poet. It should be noted that this greatly productive scholar published his first book at the age of forty; moreover, fourteen years elapsed between the publication of his first article in German studies and his second. He always repudiated with indignation the pressure on young scholars to produce prematurely.

Early in his Toronto years he was active in setting up a university-centred literary and cultural magazine, the *Rebel*, which developed into the *Canadian Forum*. Then and later, much of his influence is invisible. He prized good writing—direct, firm, and rapid. He strove all his life to perfect his own style and always welcomed discussion of details of language: he was, for instance, one of the first to object to the dangling adverb "hopefully" as a German intruder into the English language, and he sought to maintain such distinctions as that between the comparative "as much as" and the concessive "much as." More public, indeed of national importance, was his championing of the Canadian painters who came to be known as the Group of Seven, whose successful English exhibition he helped to arrange.

The second Toronto period, from his return from Manchester in 1936 to his retirement in 1957, saw the publication of most of the books on German literature which have given him a secure international reputation. *Goethe as Revealed in His Poetry* had already appeared in 1932; the magisterial *A Study of Goethe* was published in 1947; *Goethe's Faust: Six Lectures* in 1953; *Heinrich Heine an Interpretation* in 1954, and *Wilhelm Raabe* in 1961, after retirement. His *Selected Essays on German Literature*, edited by Rodney Symington, appeared in 1984. Altogether, his contributions to this field of study comprise six books, seven editions, three translations, and twenty-eight articles. It is significant that he should have excelled in studies of the central figure of German culture but that he should also have contributed crucially to the rediscovery and recognition in Germany of a neglected master, Wilhelm Raabe.

In his critical works he regularly left German passages untranslated but supplied their gist in the context, a practice requiring great dexterity in execution. In his translations he was concerned to understand the original as completely as possible and then to render it in the most idiomatic English—no "translatorese" here. Always he maintained that the interpretation of a foreign culture must be based on a deep knowledge of the culture to which one belongs.

The thirty years of his retirement were rich in honours but even more rich in achievement. He received many honorary degrees and was awarded a major

prize by the American Council of Learned Societies for his contribution to scholarship. He was elected a Fellow of the Royal Society of Canada in 1947 and a Corresponding Fellow of the British Academy in 1972. Canada and the German Federal Republic have bestowed on him their highest awards, the Order of Canada and *Pour la Mérite*.

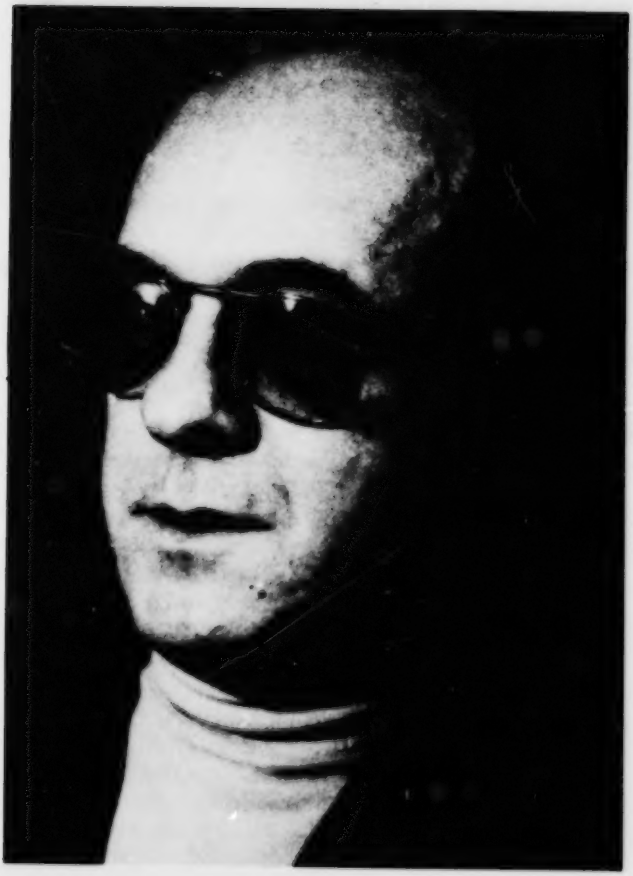
In this period, as well as writing the book on Raabe and translating two of his novels, *Stopfkuchen* and *Unruhige Gäste*, he completed the translation of Goethe's *Faust* (1970; 2nd ed., 1986). At last a *Faust* that can be read as an English book and performed on the public stage as well as studied as a world classic. Fifty years after writing them he published his *Poems of 1922*, now in a third edition. But the chief concern of his later years was painting. From the time he took it up, in 1931, long after his association with the Group of Seven, he was quite serious about it: no one who has sat for a portrait would ever mistake him for a hobbyist or a Sunday painter. Greatly encouraged and assisted by his wife Nan, he had numerous highly successful exhibitions and collected examples of his top performances in two handsome books, *Landscapes* and *Portraits*. His line drawings, *Georgian Bay Sketches*, have twice been published.

A scholar of major attainment, one whose critical works are themselves literature, Barker Fairley was not in manner or bearing at all aloof. He did not want false deference, and jealousy was utterly alien to him, yet he liked attention and needed active listeners who could help him to advance his own understanding and to broadcast his devotion to the things he believed in. His curiosity though broad was not unlimited, and he would not pretend an interest when he felt none. Nevertheless, he was making new friends until the end of his life. He could be grateful as a child is grateful, could forgive and ask forgiveness: not for him the Olympian view from which such things are trifles.

Even in advanced old age, Barker Fairley was not primarily interesting as a "link with the past," since his cast of mind was not introspective or retrospective, then or ever. Uppermost in his mind at the end was the Barker Fairley Distinguished Visitorship in Canadian Culture, newly established in University College, Toronto. He was proud of the honour, of course, but was more deeply pleased and strengthened by the thought of the good it would do the college he belonged to and the culture he had embraced.

GILLES POTVIN, S.R.C.

Serge Garant
1929–1986



MÉMOIRES DE LA SOCIÉTÉ ROYALE DU CANADA / CINQUIÈME SÉRIE / TOME II / 1987

SERGE GARANT est né à Québec le 22 septembre 1929 et mourait d'un cancer généralisé à Sherbrooke, à l'aube du ler novembre 1986. Il était âgé de 57 ans. Il avait été élu membre du la Société royale du Canada en 1984 et sa présentation avait eu lieu à Montréal le 11 avril 1986. Il avait alors proposé aux membres et à ses invités une rétrospective de l'évolution de la musique contemporaine au Québec depuis un quart de siècle, évolution à laquelle il a participé de façon marquante. La pertinence de son propos, tout comme son débit vivant et chaleureux, ne laissaient aucunement pressentir l'imminence d'une grave détérioration de sa santé et encore moins la fin tragique qui allait être la sienne, à peine six mois plus tard.

Dans tout le Canada et au Québec en particulier, l'expression « musique contemporaine » évoque d'emblée la personnalité et les initiatives nombreuses de Serge Garant. Toute sa vie, il a déployé dans ce domaine une activité inlassable, faisant sentir sa présence et son action dans tous les secteurs de la vie musicale et ceci à titre de compositeur, chef d'orchestre, pianiste, professeur, animateur et critique. Son nom restera surtout attaché à la Société de musique contemporaine du Québec dont il fut l'un des fondateurs en 1966 et son directeur artistique jusqu'à sa mort.

Tout jeune encore, il suit sa famille qui se fixe à Sherbrooke où il étudie la clarinette et le saxophone, puis le piano avec l'éminente pédagogue Yvonne Hubert. Au début, le jazz fut son unique passion mais une audition du *Sacre du printemps* de Stravinsky fut déterminante dans son choix de devenir compositeur. La découverte subséquente de la musique de Schönberg, de Berg et de Webern fut pour lui une véritable révélation. « Par la suite, » déclara-t-il, « aucune musique ne me semblait trop moderne. » Peu après, Serge Garant quitte Sherbrooke pour venir étudier l'écriture et la composition avec Claude Champagne, le grand pédagogue canadien. En 1951, il fait à Paris un séjour d'un an où il étudie le contrepoint avec Andrée Vaurabourg-Honegger et suit au Conservatoire les cours d'analyse d'Olivier Messiaen. Il fait la connaissance de jeunes lions de l'avant-garde qui s'appellent Boulez et Stockhausen.

De retour au Canada, il est animé du désir de faire connaître la musique contemporaine de qualité et il se joint à ses collègues François Morel et Gilles Tremblay pour organiser à Montréal un concert qui fut le premier à être exclusivement consacré à la musique d'aujourd'hui. Les vives réactions que l'événement suscite ne font que confirmer chez lui la nécessisté de faire connaître davantage cette musique. En 1955, il organise un concert à la mémoire d'Anton Webern et Garant y présente *Nucléogame*, considérée comme la première œuvre d'un Canadien à utiliser la bande magnétique. C'est toutefois *Anerca* qui révélera Garant au grand public en 1961.

À cette époque, Serge Garant gagne sa vie comme arrangeur et exécutant de musique populaire, une contrainte dont il se libérera peu à peu, surtout à partir de 1967, alors qu'il devient professeur d'analyse et de composition à la faculté de musique de l'Université de Montréal. Il compose cependant sans répit et des

œuvres marquantes sillonnent sa production, notamment *Fleuves* pour grand orchestre et . . . *chant d'amours* pour voix et instruments.

Au fil des ans, Serge Garant a modifié plusieurs fois son langage musical, mais son œuvre conserve cependant une remarquable unité au plan du style. Dans son ensemble, l'œuvre de Garant manifeste des qualités d'équilibre, d'harmonie, de sensibilité et de rigueur qui font de son auteur un authentique créateur.

Au cours de sa carrière, Serge Garant a reçu de nombreuses distinctions comme la médaille du Conseil canadien de la musique (1971), le trophée Harold Moon de la Société de droits d'exécution du Canada (1978), le Prix de musique Calixa-Lavallée (1979) et le Prix Jules-Léger pour la nouvelle musique de chambre (1980). La même année, il était créé Officier de l'Ordre du Canada.

Quelques semaines à peine après le décès du musicien, paraissait chez l'éditrice Louise Courteau, un ouvrage substantiel : *Serge Garant et la révolution musicale au Québec* de Marie-Thérèse Lefebvre. On y trouve réunis les écrits et conférences de Garant, ainsi que le récit de sa carrière et l'analyse de ses œuvres, avec une préface de Pierre Boulez.

V.K. PREST, F.R.S.C.

Conrad Percival Gravenor 1923–1986

TRANSACTIONS OF THE ROYAL SOCIETY OF CANADA / SERIES V / VOLUME II / 1987

CONRAD PERCIVAL GRAVENOR was born in Renfrew, Ontario, to Horace P. Gravenor, a Baptist minister, and Annie M. (Burden) Gravenor. The youngest of four children, he spent his early years in Lunenberg, Nova Scotia. The family then moved to Omemee, Ontario, where Conrad attended grades nine and ten. When the family moved to Toronto, he attended Harbord Collegiate. On graduating in 1943 he enrolled at the University of Toronto for the 1943–44 term but then joined the Canadian Armed Forces and served in the artillery to the war's end. He then took on a teaching assignment with the Armed Forces in Holland, which extended into 1946.

On Conrad's return to Canada he enrolled at the University of Toronto with support from the Department of Veterans Affairs. In his final year, he married Anna Brown, on 17 September 1948. Graduating with a B.A. degree in 1949, he was awarded the Coleman Gold Medal in geology, and the Regent's Gold Medal for science. His experience during summer months on geological field parties for the Ontario Department of Mines led to his first publications.

In the autumn of 1949 Conrad enrolled at the University of Wisconsin to advance himself in the field of sedimentology under Professor F.T. Thwaites, and in mineralogy and petrology under Dr. R.C. Emmons. He obtained his M.SC. in the spring of 1950. Being highly recommended, he received a Research Fellowship from the Indiana State Conservation Board and was able to enroll at the University of Indiana to pursue his doctorate in glacial geology under Professor Wm. D. Thornbury, with a minor in chemistry. He was associated there with Roger E. Deane, who was employed during the summer months by the Geological Survey of Canada in the Lake Simcoe area of Ontario. This connection led to his being employed by the Survey to map the adjoining Lindsay-Peterborough area. In spite of the heavy schedule of winter studies and summer fieldwork, he obtained his PH.D. in 1952. He had already published a paper on the "Bedrock source of tills in southwestern Ontario" resulting from his fieldwork for the Ontario Department of Mines.

Dr. Gravenor's preliminary reports and maps for the Geological Survey of Canada were published in the years 1952–54, and his memoir on the Lindsay-Peterborough area was released in 1957. It was during the fieldwork in that region that the writer became better acquainted with him. He was a most pleasant companion, and his enthusiasm for and comprehension of the work were readily apparent.

Conrad Gravenor received an appointment as a Lecturer at the University of Alberta and commenced his work there in the autumn of 1952. After two years he was promoted to Assistant Professor. During the summers he worked as a party chief for the Alberta Research Council and completed reports and maps on several areas in east-central Alberta. In the meantime he published two mineralogical papers in the *American Journal of Science* and *American Mineralogist*. In spite of his teaching schedule and summer mapping program, he found time to round out several informative papers on drumlins, prairie

mounds, and the use of indicator minerals in till, resulting from his fieldwork in both Ontario and Alberta.

His diverse abilities were not lost on the Research Council; he was offered and accepted the position of Chief Geologist for the Council in 1956. In 1959 he was promoted to Chief of the Earth Sciences Branch. He thus took on the added responsibility for the administration of the Alberta Soil Survey, and the Groundwater and Metallurgy Divisions of the Council. In spite of these duties he co-authored learned articles on such diverse subjects as "Ice-disintegration features in Western Canada," "Glacial fluting in central and northern Alberta," "Colloidal-size silica in sediments," "Stream-trench systems in east-central Alberta," an "Atlas of air photographs of the Plains Region of Alberta," "Glacial deposits of Alberta," and, in his own name, on "Heavy minerals of the Athabasca Sandstone" and "Iron Deposits in Western Canada."

As a result of Dr. Gravenor's association with the metallurgy unit of the Research Council and his own background in both chemistry and mineralogy, he turned his attention to the field of hydrometallurgy and the use of chlorides in the treatment of low-grade iron deposits. This led to a sabbatical in 1964 as a Research Associate at the Institut de Recherche de la Siderugie in Metz, France, and then at the Nordac Chemical Company in Uxbridge, England. As a result of his research work in this field he obtained eight patents applicable in twenty-eight countries.

On Dr. Gravenor's return to Canada in 1965, he was appointed Assistant Director of Research for the Alberta Research Council. Later in that same year, however, he accepted the position of Director of Research for the Peace River Mining and Smelting company. In 1968 he became a vice-president of that company as well as the general manager of their steel mill in Amherstburg, Ontario. By 1969, however, his interest in the academic life and proximity to the University of Windsor led him to utilize his lunch hours to teach a course in Engineering Geology as a Visiting Professor for the academic year 1969–70. In 1970 he accepted the position of Vice Dean for the Division of Science and Mathematics at the University. In 1973 he became Dean of the Faculty of Science and Mathematics, a position he held for the next decade.

Dr. Gravenor was also a full Professor in the Department of Geology and taught courses in glacial geology. He actively participated in the developing field of research on paleomagnetic methods and magnetic fabric analysis with Professors D.T.A. Symons and M. Stupavsky. Many joint papers with one or both of these researchers were published in the following years. These papers cover such diverse topics as the paleomagnetism of tills, paleomagnetism and its relationship to till deposition, paleomagnetism and the magnetic fabric of till, DRM errors in Pleistocene tills, water release from the base of glaciers, magnetic fabric around boulders in till, remnance resetting by shock-induced thixotropy, convention for reporting magnetic anisotropy of till, and many others. He also found time to publish on the "Yarmouth drumlin field in Nova

Scotia," on "The origin of drumlins," "Erosion by continental ice sheets," "Ice-movement direction from drumlin morphology" (co-author), and "A mechanism to explain the preferred spacing of glacial streamlined landforms" (co-author). He was also interested in chatter-marked heavy minerals in both Pleistocene sediments and older rocks. His first paper (co-authored) was on chatter-mark trails on heavy minerals in glacial sediments.

On a sabbatical from the University of Windsor in 1977–78 Conrad Gravenor travelled to many countries to study pre-Pleistocene glacial deposits. He collected samples for paleomagnetic and heavy mineral studies. This resulted in several papers co-authored with colleagues at home and abroad. They include papers on paleomagnetism and chatter-marked heavy minerals of certain Precambrian and Paleozoic rocks from such diverse places as Newfoundland, Scotland, South Africa, Australia, and Brazil. There was also an intriguing paper explaining the absence of heavy minerals from certain tillites in South Africa and Australia. Some of these co-authored papers have promoted much useful discussion. Another very important paper, by Gravenor, von Brunn, and Dreimanis was published in 1984 on the nature and classification of waterlain glaciogenic sediments, exemplified by Pleistocene, Late Paleozoic, and Late Precambrian deposits.

Dr. Gravenor's untimely demise from cancer has assuredly robbed the world-wide glacial community of a brilliant scientist. He was a Fellow of the Royal Society of Canada from 1963. He had been serving as Chairman of the Canadian Quaternary Association (CANQUA), preparing for the International Meeting (INQUA) to be held in Ottawa in July 1987, until ill health forced his resignation. Though he had resigned as Dean of the Faculty of Science and Mathematics at the University of Windsor in 1983, he continued on as a Lecturer for the large introductory course for Science Majors, thus remaining active to the end. His hobbies were skiing and sailing.

Dr. Gravenor is survived by his wife Anna, daughter Adriane, and son Christopher.

KAROL J. KRÓTKI, F.R.S.C.

Eric J. Hanson
1912–1985

TRANSACTIONS OF THE ROYAL SOCIETY OF CANADA / SERIES V / VOLUME II / 1987

ERIC J. HANSON was born in Sweden in 1912 and died in Edmonton on 31 December, 1985. He emigrated from Sweden with his parents to an Alberta farm in 1925. In 1931, he earned a teaching certificate in the province of Alberta, and had a career as a school teacher and principal before and after attending Queen's University, where he graduated with a B.A. in 1942. He completed an M.A. in Economics at the University of Alberta in 1946, and a PH.D. in Economics at Clark University in Massachusetts in 1952.

Dr. Hanson joined the Department of Political Economy at the University of Alberta as a Lecturer in 1946, and rose to the rank of Professor in 1957. He served as Administrator of the Department of Political Economy from 1952 to 1957, and Head of the Department from 1957 to 1964, a period of relatively rapid student and staff growth immediately prior to the administrative separation of the Calgary campus from the University of Alberta. He was the last Head of Political Economy before the division of the department into Economics and Political Science. Dr. Hanson went on to serve as Associate Dean of Graduate Studies for the years 1964 to 1967, and then he returned to full-time teaching until his retirement in 1974. In October 1982, he published *A History of the Department of Economics* as the Department's project for the seventy-fifth anniversary of the University.

Dr. Hanson was elected a Fellow of the Royal Society of Canada in 1965, and a Fellow of the Royal Society of Health (London) in 1972. In 1962, he had been the NATO Visiting Professor for Canada.

Dr. Hanson's special fields were the economics of government finance and the economics of petroleum. Perhaps the best known of his many writings is the book *Dynamic Decade* (1958) on the remarkable growth of the oil industry in Alberta. His work always contained an optimistic and bold view of the future, a future in which brain replaces brawn and good education and intelligent planning become ever more important. He worked at many levels to help Alberta, Edmonton, and the University of Alberta to prepare for such a future, for example, in his research into the financing of education in Alberta, in his work as an adviser to the cities of Edmonton and Calgary, and, among many administrative tasks on the campus of the University, as an important force behind the development of the university libraries.

Dr. Hanson is survived by his wife, Helen, two brothers and one sister, and nine nieces and nephews.

To commemorate Dr. Hanson's contribution to the University of Alberta, the Department of Economics has established an annual distinguished lecture series in his name. The interest income from the endowment fund supporting the Eric J. Hanson Memorial Lecture Series is matched by the provincial government. The Memorial Lectures, each of which will be delivered at, and subsequently published by, the University of Alberta, and which will concentrate on general themes in applied public economics, will provide a fitting memorial to an important contributor and builder of the social science

disciplines, and especially of the Department of Economics, at both the University of Alberta and the University of Calgary. Fittingly, the first Hanson Memorial Lecture was delivered by John Whalley, another Fellow of the Royal Society of Canada, on 10 February, 1987, on a subject close to Hanson's mind and heart, "Tax Reform in Canada: Issues and Options."

R.R. ROGERS

Walter Francis Hitschfeld 1922–1986

TRANSACTIONS OF THE ROYAL SOCIETY OF CANADA / SERIES V / VOLUME II / 1987

WALTER FRANCIS HITSCHFELD, Professor of Meteorology and Physics at McGill University, widely known for his contributions to science and science policy, died at home in Montreal on 28 May, 1986, after a year's struggle with cancer. He was sixty-four years old.

Born in Vienna on 25 April, 1922, Walter Hitschfeld was sent by his parents to England before the outbreak of World War II, in the hope that he could complete his schooling there. Though classified as a refugee from Nazi oppression, he was rounded up with other "potentially dangerous persons" in the spring of 1940 and, in one of the stranger pages of Commonwealth history, was shipped to Canada for internment. He was among those assigned to "A" Camp in Farnham, Quebec, which led to his first encounter with McGill University. For it was at "A" Camp that Henry Marshall Tory, then in his seventies, helped to organize a camp school and arranged for the internees to write McGill matriculation examinations.

Walter Hitschfeld was one of the students who did so well in the improvised school that sponsors were readily found for their early release to pursue further studies. He was sponsored by James Charles McGuigan, Archbishop of Toronto, later to become Cardinal.

After a term at St. Francis Xavier University, Hitschfeld transferred to the University of Toronto, where he was admitted to the program in engineering physics. He earned his bachelor's degree in 1946, in which year he also became a Canadian citizen. On graduating, he moved first to Ottawa, where he worked briefly at the Defence Research Board, thence to Montreal, to a lectureship in physics at Loyola College and graduate studies at McGill. In the fall of 1947, he married Irma Morissette of Haileybury, Ontario, whom he had met two years earlier in Toronto where she was a student at the Royal Conservatory of Music.

Deciding early at McGill to specialize in atmospheric physics, Walter Hitschfeld was one of the first student members of the Stormy Weather Group, which Dr. J. Stewart Marshall had recently brought to McGill from the Canadian Army Operational Research Group. Radar had just become available for meteorological research. Marshall's group was one of the few laboratories in the world equipped with the hardware and the intellectual resources needed to exploit the new tool. In a matter of a few years, the group contributed to the understanding of the formation of rain and snow in clouds, to the theory of thunderstorm dynamics, and to the application of radar to hydrology and weather forecasting. Walter Hitschfeld's PH.D. thesis was on the collision and coalescence of water droplets, a subject that is still at the heart of cloud physics.

In addition to his research at McGill and teaching at Loyola, Hitschfeld worked for the newspaper the *Canadian Register* in the summer of 1947. As a way of earning his passage and qualifying for a visa into parts of occupied Europe, he traveled as a reporter across Europe to Vienna, writing five long articles on the postwar situation in England and in Austria. These articles give a vivid and sympathetic picture of the living conditions and call for assistance from the West to help heal the wounds of war.

After receiving his doctorate in 1951, he was appointed Lecturer in physics at McGill, continued as a core member of the Stormy Weather Group, and subsequently advanced through the academic ranks. A charter member of the Department of Meteorology when it was formed in 1959, he was honoured with the Canada Steamship Lines Chair in 1962, and served as Chairman from 1963 to 1967.

He made his mark in several different areas of research during this time. The work on drop coalescence was published in 1951 in the *Journal of Meteorology* as a joint paper with his close friend and fellow student Kenrick Gunn. With Marshall and P.R. Wallace, he contributed to a definitive pair of papers on the statistics of weather radar signals in the *Canadian Journal of Physics* of 1953. Other landmark contributions were the studies of Alberta hailstorms with R.H. Douglas and, following an extended visit at Oxford University in 1960, the analysis of ozone effects on infrared radiative transfer in the atmosphere with J.T. Houghton. Three of his papers up to 1964 earned First Darton Prizes of the Royal Meteorological Society.

As his reputation in atmospheric physics spread, Walter Hitschfeld also became increasingly recognized for his wisdom, diplomacy, and administrative ability. In 1967 he was appointed Vice-Dean for Physical Sciences at McGill. Admired for his judgment and fairness, he was chosen in 1971 to fill the newly created position of Dean of Graduate Studies and Vice-Principal (Research). In this position he was a vigorous advocate at the national level for science education and the need for adequate research funding.

Dr. Hitschfeld served on many national and international committees, including those of the National Research Council, the Canadian Meteorological and Oceanographic Society, the American Meteorological Society, the University Corporation for Atmospheric Research, and the World Meteorological Organization. He was Member and Chairman of the NRC Committee on Meteorology and Atmospheric Science from 1966 to 1969, President of the International Commission on Cloud Physics of the International Association of Meteorology and Atmospheric Physics from 1975 to 1984, and President of the Canadian Meteorological Society in 1973–74. He will be remembered for organizing the International Conference on Cloud Physics in Tallinn, Estonia, in August 1984. Fluent in German, English, and French, he was one of Canada's most effective science ambassadors.

Among many honours and awards, Dr. Hitschfeld was elected Fellow of the American Meteorological Society in 1968 and Fellow of the Royal Society of Canada in 1978. Also in 1978 he received the Patterson Medal of the Atmospheric Environment Service, Canada's highest award in meteorology.

Amazingly, in addition to teaching, research, administration, and a full calendar of scientific committee work, Dr. Hitschfeld found time to serve on boards responsible for educational policy: the Commission de l'Enseignement secondaire of the Conseil supérieur de l'éducation du Québec for six years, Commission de la recherche universitaire (1972–79), President of the

Canadian Association of Graduate Schools (1974–75), and President of the Canadian Association of University Administrators (1977–78).

During the time of his heaviest administrative burden—roughly the decade of the 1970s—Dr. Hitschfeld confined his research interests mainly to two subjects, convective storms and weather modification. Accordingly, when he resigned from his administrative position in 1980, he divided a sabbatical leave between the Convective Storms Division of the National Center for Atmospheric Research in Boulder and the Université de Clermont, where he gave a course in radarmétéorologie. While in Europe, he also undertook a study on behalf of the Science Council of Canada of the research and science policy in Germany. His report of January 1982, "Funding of Research and Higher Education in the Federal Republic of Germany," describes the successful co-operative system of federal and provincial research funding in that country as an example of how federalism can work.

Returning to McGill in 1981, in addition to his duties in the Department of Meteorology, Dr. Hitschfeld accepted the directorship of McGill International, the campus office devoted to establishing relations between the McGill community and appropriate institutions and individuals in the Third World. His efforts led to many exchanges of students and staff members and to McGill-directed research and engineering projects abroad.

There was no let-up in activity during Dr. Hitschfeld's last year; in fact, many colleagues were unaware of the fatal illness. He taught the large course in introductory meteorology in the winter term. He was active as a Trustee of the University Corporation for Atmospheric Research and a Councilor of the American Meteorological Society. His main project was to lay the groundwork for a Montreal-based, collaborative institute for mesoscale meteorology that would bring together meteorologists from the Atmospheric Environment Service, the Université du Québec, and McGill. Although the future of the project is now uncertain, the concept of the institute is a testimony to his vision and scientific leadership.

Such a remarkable career cannot be accounted for simply by industry and breadth of intellect, which he had in abundance. It was the fine human qualities of Walter Hitschfeld that made the difference. Compassionate, responsible, though with a ready sense of humour, he was unwilling to turn his back on the agonies of the world. It was a dedication to the betterment of mankind that motivated him.

By his many friends, Walter Hitschfeld will be remembered for his wit and wisdom, his charm and urbanity. He was able to bear his burdens lightly, and had the gift of making those around him feel better. His zest for life never failed. Even in the final weeks he had a buoyant attitude and continued to thrive on intellectual excitement. A grievous loss to Canada and the world is the passing of so great a spirit. He is survived by his wife, Irma, sons Paul and Charles, and five grandchildren.

CLARA THOMAS, F.R.S.C.

Jean Margaret Wemyss Laurence 1926–1987

TRANSACTIONS OF THE ROYAL SOCIETY OF CANADA / SERIES V / VOLUME II / 1987

JEAN MARGARET WEMYSS LAURENCE has died at the age of sixty and Canada has lost a beloved writer and a social activist whose deepest beliefs were directed to freedom, tolerance, and understanding between individuals and among nations. "We must attempt to communicate, however imperfectly, if we are not to succumb to despair or madness. The words which are spoken are rarely the words which are heard, but we must go on speaking," she wrote in *Long Drums and Cannons*, her study of the Nigerian writers who began to flower in the decade of the 1960s. Her life and her writings were wholly dedicated to this conviction.

The town of Neepawa, Manitoba, in which she was born, was transformed into Manawaka, the fictional town that Canadians have come to regard as quintessentially their own. It is the background setting for *The Stone Angel* (1964), *A Jest of God* (1966), *The Fire-Dwellers* (1969), *A Bird in the House* (1970), and *The Diviners* (1974). Her heroines form a unique galaxy in our fiction: Hagar, the proud, bitter ninety-year-old who learns to receive and to give love just before it is too late; Rachel, the spinster school-teacher who finds a measure of freedom and a sustaining selfhood through the ordeal of one Manawaka summer; Stacey, her sister, a beleaguered housewife and mother who develops and reveals to us her extraordinary qualities of vitality, fortitude, and love; Vanessa, the child whose maturing is based on Margaret Laurence's own early experiences of family loss and grief; and Morag, the destined writer whose story brings the Scottish pioneers and the Métis outcasts of Manawaka together and culminates in the joining of past and present and the affirming of the future in the person of Pique, the daughter of Morag and Jules Tonnerre. The Manawaka cycle is, indeed, "planted firmly in some soil," as Margaret Laurence insisted all good writing must be—the soil of Manitoba, its people, and its history, which she knew and drew upon for her deepest inspiration.

She served a long apprenticeship as a writer, in scribblers as a child, in the high school paper as a teenager, in *Vox*, the United College yearbook, as an undergraduate in Winnipeg in the 1940s. But it was not until she married Jack Laurence, an engineer, and in 1949 went with him to Africa to build dams for the British Ministry of Overseas Development in Somaliland and then in Ghana, that she found the catalyst that the full flowering of her talent required. In Somaliland for two years, her awakened interest in its wealth of oral literature resulted in *A Tree for Poverty*, translations of both poetry and tales, published in 1954 by the British Protectorate. Her five years in Ghana produced the collection of short stories *The Tomorrow-Tamer*, the novel *This Side Jordan*, and the travel-autobiography of the Somaliland years, *The Prophet's Camel-Bell*, all of these published after the Laurences, now with two children, Jocelyn and David, returned to Vancouver in 1957. The African years had confirmed in Margaret Laurence's mind her calling as a writer; they had convinced her that she must now write about her own people; and they had

given her the confidence to do so. Now the Manawaka novels began, the name of her town going back decades to her childhood scribbler-novels.

In 1962 Margaret Laurence and her children moved to England, where Elm Cottage in the village of Penn, Buckinghamshire, was their home until 1974, when she moved permanently back to Canada. It was at Elm Cottage that the Manawaka novels were largely written, though from 1969 on, when she and Jack Laurence divorced, she spent a good deal of time in Canada, as writer-in-residence at the Universities of Toronto, Western Ontario, and Trent, and at her cottage on the Otonabee, near Peterborough. Her works had been recognized from the start as landmark events in Canadian literature, and she was much in demand as a visiting lecturer and a speaker all over the country. She responded with generosity of time and talent. In all, fourteen of Canada's universities presented her with honorary degrees. She was made a Companion of the Order of Canada and served as Trent's Chancellor from 1980 to 1983. She was also extremely active in the burgeoning Writers' Union, the first interim president of its formative months in 1972–73. All other writers were her "tribe," as she often said, and her care for and encouragement of young writers was endless.

Her move to Lakefield, near Peterborough, country she already loved because of her cottage, was coincidental with the publication of *The Diviners* in 1974. Her books were widely translated and read abroad, and *The Stone Angel* was the first Canadian work to be placed on the course for France's prestigious *agrégation* examination. Twice in the following ten years she was harassed by book-banners, once in the Peterborough district, once, and most hurtfully, in her own town of Lakefield. In both cases massive support for her books' essential morality and humanity negated the would-be censors' efforts, but the cost to her was very great. Typically, she turned to positive action, not only fighting the book-banners in many interviews and public appearances, but giving more and more of her time to causes relating to the good of all people, and particularly to the promotion, by all and every means, of the cause of world peace. She supported Project Ploughshares, Energy Probe, Amnesty International, Caral, International P.E.N., Pollution Probe, and many others, with all her resources, personal and financial.

The "social gospel" had been alive in the air of Manitoba as she grew up, and its tenets were very much a part of Winnipeg's United College while she was a student there. Frank Scott, Tommy Douglas, and Stanley Knowles were three of the Canadians she admired most; like theirs, social justice was her ruling ideal, and she pursued it constantly, implicitly in all her writing, explicitly in her activism. Her total commitment is best expressed in words from an extraordinarily powerful article written for a seminar at Trent University, "If I Had One Hour To Live": "We must take on responsibility for our lives and our world and we must be prepared to make our government listen to and hear us. Our aim must be no less than human and caring justice, and peace . . . for all people that on earth do dwell."

Her legacy to us is already great. To it will be added her memoir, *Dance on the Earth*, still to be published. In it she affirms once more the hope, faith, and gratitude for life that informs all her work:

> Him serve with mirth, His praise forth tell;
> Come ye before him and rejoice.

JEAN DARBELNET, S.R.C.

Jean-Marie Laurence
1906–1986

MÉMOIRES DE LA SOCIÉTÉ ROYALE DU CANADA / CINQUIÈME SÉRIE / TOME II / 1987

JEAN-MARIE LAURENCE est mort en juillet 1986 à l'âge de 80 ans. Depuis déjà plusieurs années, son état de santé avait considérablement ralenti ses activités professionnelles. De toute façon, il avait alors derrière lui une carrière variée et bien remplie, et il avait le droit d'estimer que, dans son domaine, il avait fait œuvre utile. Ce domaine était essentiellement la défense et l'épanouissement du français au Canada, dans sa qualité et son extension. On peut dire que ses différentes activités ont tendu vers cet objectif.

Il est normal qu'après la Conquête, les Québécois, livrés à eux-mêmes, aient eu le souci de garder, en même temps que leur foi, leur identité culturelle et par conséquent leur langue. Et on ne s'étonne pas non plus que ce souci majeur ait inspiré et animé des vocations. La *Bibliographie linguistique du Canada français* que le professeur Gaston Dulong, de l'université Laval, a fait paraître en 1966, remonte jusqu'à l'année 1691. Les ouvrages qu'elle passe en revue ne sont pas tous, tant s'en faut, consacrés à la langue. Y figurent aussi des livres et articles qui, traitant des sujets divers, portent incidemment des jugements sur le parler des Canadiens français. C'est le cas, par exemple, du Journal du marquis de Montcalm qui y note en 1756 que « les paysans canadiens parlent très bien le français » et emploient volontiers des expressions empruntées à la langue des marins. Parmi ceux qui ont fait œuvre de chroniqueurs de langue, on pense à Arthur Buies avec ses *Barbarismes canadiens* en 1865, et à Tardivel lançant son cri d'alarme, *L'anglicisme voilà l'ennemi*, qui est de 1880. Tous deux étaient des journalistes et non des enseignants, mais bien placés, cependant, pour juger le français tel qu'il se présente dans la vie publique de tous les jours. Étant donné l'éloignement de la mère patrie et le voisinage de la langue des conquérants, il était à prévoir que le français du Canada subirait, bien avant le français de France, la pénétration de l'anglais, et cela d'autant plus que pendant longtemps les relations avec l'Hexagone sont restées moins suivies qu'elles le sont maintenant.

Jean-Marie Laurence prend ainsi rang au sein de toute une pléiade de défenseurs de la langue française. Ses prédécesseurs comptent aussi Adjutor Rivard, et parmi ses contemporains il y a lieu de mentionner Victor Barbeau, Pierre Daviault et Gérard Dagenais. Ils ont chacun une physionomie et une orientation particulières. L'originalité de Laurence est d'avoir été avant tout un enseignant et, en tant que professeur à l'École normale Jacques-Cartier, un enseignant de futurs enseignants, ce qui de toute évidence a rehaussé l'importance de ses fonctions, dont il s'est acquitté avec une efficacité remarquable. Son professorat a été une véritable vocation et a inspiré des ouvrages tels que ses *Notes méthodologiques sur l'enseignement du français*, en 1945, et sa *Grammaire* parue en 1957.

Les *Notes méthodologiques* sont particulièrement révélatrices de sa conception de l'enseignement de la langue maternelle. Laurence était en effet un homme de méthode plutôt que de théorie. Les théories du langage, si en l'honneur à notre époque, ne l'intéressaient guère. Il travaillait dans le concret. Il concevait son rôle comme celui d'un observateur des faits de langue, qui

étaient la substance de son enseignement, ce qui l'amenait naturellement à réfléchir aux difficultés qu'ils présentaient pour ses élèves et à aviser aux moyens de les résoudre. La solution passait par des règles qu'il convenait d'exposer le plus clairement possible en les illustrant d'exemples soigneusement choisis, pour passer ensuite à des exercices d'application. Qui dit règles dit norme et effectivement son enseignement était normatif. Ajoutons qu'il était intelligemment normatif parce qu'il conciliait son désir de respecter le génie de la langue et son évolution. Il ne saurait être question, pensait-il, de laisser la langue aller à vau-l'eau, et en même temps il faut tenir compte du fait qu'elle ne reste pas figée et continue à évoluer du fait même qu'elle est vivante. Il a ainsi formé des générations d'enseignants en leur donnant une base solide et pratique. C'est l'aspect fondamental de son œuvre et qui commande le reste de son activité, car il y a plus.

L'importance des médias s'est fait sentir au moment où il approchait de la force de l'âge. Il était jeune homme lorsque la radio, d'abord limitée aux communications télégraphiques, a pris une nouvelle dimension avec la possibilité de diffuser oralement des messages qui avant ne pouvaient être qu'écrits. Il arrivait à la trentaine quand a été créé Radio-Canada, et quelques années plus tard il participait à la diffusion de chroniques de langue élaborées en équipe, notamment à celle qu'animait Marcelle Barthe sous le nom de « la langue bien pendue ». C'était une nouvelle carrière qui commençait, mais dans le sillage de la première. L'occasion lui était en effet donnée de faire profiter de son savoir et de son expérience un public sans doute moins motivé mais beaucoup plus étendu, beaucoup plus divers que le public scolaire, et selon une formule qui permettait de toucher à une multitude de points de langue sans subir la contrainte d'un programme rigide. Il l'a fait avec la sûreté de touche qui caractérisait son enseignement écrit et oral. On peut dire qu'il a continué dans la même voie en se renouvelant. Il excellait, devant le micro, dans une langue simple, à remonter à la cause de la difficulté qui lui était soumise en disant, par exemple, qu'il ne fallait pas confondre deux substantifs dérivés respectivement des verbes *acquérir* et *acquitter* : même prononciation (d'où le problème), mais deux sens différents et deux orthographes distinctes. En quelques mots il avait ainsi fait le tour de la question. Élémentaire, dira-t'on. N'empêche que de bons auteurs s'y sont laissés prendre.

Par la suite, il passa, toujours sur la même lancée, à la télévision de Radio-Canada. La situation qu'il s'était ainsi faite dans l'exercice de son enseignement et devant le micro lui valut d'être élu à la Société royale en 1953, et quand en 1968 fut créé le Conseil international de la langue française représentant les pays de la francophonie, il fit naturellement partie de la délégation québécoise.

Que ce fut dans son enseignement, aux colloques ou sur les ondes, ses présentations étaient marquées par une courtoisie souriante, la modération, le bon sens. Il n'avait pas la raideur, l'intransigeance d'un de ses éminents

confrères qui lui aussi a contribué à inculquer à ses lecteurs le goût de la bonne langue, à savoir Gérard Dagenais qui avait radicalement opté pour le français de France à l'exclusion de toute particularité québécoise. Quelqu'un a dit de Laurence qu'il avait été « le grand agent de la mutation du français au Québec, qu'il en avait assuré la promotion. » À cet égard, son attitude contraste avec celle de censeurs plus sévères. Mais pour lui, il ne devait pas y avoir de barrière entre le français de l'Hexagone et celui des autres pays francophones. Dans le cas du Canada, son souci était de voir le français s'y épanouir sans entraves inutiles. Et l'on peut dire que cela a été son plus grand mérite de garder ces deux variétés en symbiose.

L. M. DICKIE, F.R.S.C.

Gordon Arthur Riley
1911–1985

TRANSACTIONS OF THE ROYAL SOCIETY OF CANADA / SERIES V / VOLUME II / 1987

GORDON ARTHUR RILEY was born and raised in the Ozark country of southern Missouri, and its formative influences may help account for the strongly individualistic style of his life and work. Behind the genial and kindly man who encouraged students and junior associates as though they were dearly loved family was a personality governed by an uncompromising modesty in the appreciation of his own worth, combined with a remarkable independence of mind and a penetratingly no-nonsense view of the sometimes less rational interactions of the rest of us. But Gordon Riley never confused the requirement for discrimination with the false temptations of easy judgment, either in his relations with fellow scientists or in dealing with the subject matter of his own science of oceanography. His dry wit and talent for pungent statement sometimes highlighted the foibles of others with an unexpected flash of humour, but his assessments of associates and of scientific problems alike achieved a balance and an objectivity that are rarely matched.

The Ozark legacy may have defined the themes of his life style; it cannot account for the unusual intellectual capacity that made his personal research papers leaders in a whole new phase of paradigm development in oceanography. He had appeared at Yale University in 1934, following an undergraduate degree at Drury College and an M.SC. at Washington University, where, as he claimed, he had rarely heard of the oceans, let alone oceanography. But even his M.SC. thesis on tunicate embryology revealed his bent for a system dynamics rather than a description of parts. His PH.D. thesis, undertaken under the direction of G. Evelyn Hutchinson after a brief unrewarding further excursion into embryology, was a treatment of the chemical limnology of a number of small ponds and lakes near New Haven. It was carried out in a manner which made it an embryonic study for what was later to become a new comprehensive approach to the dynamics of biological production in the sea. It was his genius to see precedents for an understanding of ecological processes in the energy concepts of the early chemists and physiologists, provided that they be drawn into the setting of the physical and chemical dynamics of the environment itself. It was the hallmark of his work that the daunting complexity of these systems should emerge from his analyses with an apparent simplicity and clarity. He identified and separated specific interactions out of the seemingly endless set of possible cause-effect relations with a kind of mathematical precision, and subjected them to experiment, argument, and statistical analysis in a manner that allowed their recombination into a balanced picture of a whole. The clarity of his conceptualization and the style of his analysis, which demonstrated new-found powers of discrimination, set a tone for scientific endeavour in biological oceanography for over thirty years.

Gordon Riley's scientific career was firmly rooted in observation. Beginning with the microcosm of Linsley Pond, his work in oceanography took him initially to Long Island Sound and the Gulf of Mexico, thence to the Sargasso Sea, Georges Bank, and the western North Atlantic and finally back to Long Island Sound, where some of his most comprehensive observational and

modelling work was done in conjunction with graduate students and associates in all the scientific disciplines necessary to a knowledge of oceanographic systems. On land he divided his time between the Woods Hole Oceanographic Institution and the Bingham Oceanographic Laboratory of Yale University. In 1965 he moved to Dalhousie University to develop the Institute of Oceanography, which had been founded by F. Ronald Hayes as the University complement to the Bedford Institute of Oceanography in the formation of a major oceanographic research centre in the Halifax area. His outstanding success in the creation of a strong university department from a loosely associated group of research workers was a testimonial to the strength of his scientific conceptions translated into administrative arrangements. What began as a heterogeneous collection of scientists grouped together for operational convenience but still primarily pursuing their own particular disciplinary interests in the oceans soon took on the character of a new science. Under his guidance and tutelage, graduate students and associates alike began to see that the phenomena being studied were more a result of interaction of parts than of the internal dynamics attributable to laws of chemistry, physics, biology, or geology alone. The understanding that oceanography was more than an integration of techniques and operations, yet was based on a necessarily comprehensive knowledge of the conventional disciplines, led him to the formation of an institution which, in the course of a single decade, became a major international centre in the education and training in research for a true science of the sea. He remained active in the writing and editing of oceanographic publications and in the guidance of graduate students after stepping down as Head of the Department in 1974 and appointment as Professor Emeritus following his official retirement in 1976.

His influence on the Department of Oceanography is still evident in the attitudes and standards of its staff and students. Yet it extends beyond through the many former students and associates in oceanography in Canada, particularly at the Bedford Institute of Oceanography, and in many other countries of the world. In 1982, as a special mark of their respect, a number of the oceanographers who worked most closely with him at Yale and at Dalhousie published a book in which was reprinted a selection of twenty of the scientific papers deemed by them to have been among his most influential works. This remarkable gesture represents a particularly strong supplement to the generous legacy he himself gave to his science and to his colleagues in his more conventional and modest ways.

JOHN T. EDWARD, F.R.S.C.

Alfred Taurins
1904–1986

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"MAY YOU BE fortunate to live in uninteresting times" runs the old Chinese saying. Alfred Taurins lived in troubled times, but in the end he overcame many obstacles to realize in Canada a life of fulfilment and scholarly distinction.

He was born in 1904 in Dauguli, a small village in Latvia, which was then a part of the Russian empire. His father was a blacksmith, and Alfred had an older sister and three brothers, one older, two younger. When he was twelve years old and helping one of his younger brothers chop wood, he had the tendon of his right index finger severed. The finger stopped growing and only partially recovered its power of movement, so that he could not do military service or follow his father's trade, and he became the scholar of the family. He went to school in the nearby town of Valmiera.

In 1923, at the age of nineteen, Alfred Taurins went to Riga, by now the capital of an independent Latvia, and lived with his sister while attending the University of Latvia. Riga had been a city in the Hanseatic League, and the German presence and influence were still strong. The technical university (*Polytechnikum*) had started in the previous century as a German language institution, and from its chemistry department had graduated Wilhelm Ostwald, a German-speaking Balt who became one of the founders of physical chemistry and an early Nobel laureate. In 1895–96 the Polytechnikum was reorganized into the Polytechnical Institute of Riga, therafter supported by the state so that Russian replaced German as the official language of instruction. After many vicissitudes in 1915–19, the Polytechnical Institute of Riga was taken over in August 1919 by the government of newly-independent Latvia and incorporated into the University of Latvia. The committee for this reorganization was chaired by Paul Walden, a very distinguished chemist of Latvian peasant origin.

From this university, Alfred Taurins graduated in 1930 with the degree of Chemical Engineer and married Milija Neimanis, whom he had known since schooldays in Valmiera. He stayed on to become a senior instructor in chemistry, and to start research in organic chemistry. For this he received a doctorate in 1936, and in 1938 he became a Privat Docent in Organic Chemistry.

In 1939, Dr. Taurins went to spend a sabbatical year in Heidelberg at the institute of Professor Richard Kuhn, leaving behind his wife and their two young daughters. Kuhn at this time was at the height of his fame, and received the Nobel prize in 1940. In his institute Alfred worked on the quantitative determination of sulphur-containing amino-acids in globins. However, by summer the approach of war caused him to go back to Latvia to a post in the Agricultural Academy in Jelgava, in the country north of Riga. In the following year he was appointed Professor of Chemistry and Head of the Department of Chemistry, a post which he held until 1944.

These were troubled years. The Red Army occupied strategic positions in Latvia in 1939, and in 1940 the country was absorbed into the Soviet Union. Then in the summer of 1941 the country was overrun by the German army on its

march eastwards. Alfred Taurins continued teaching, and even did a little research on amino-acids. The summer of 1944 found the family in the country at an old family property in Valmiera, when the approach of fighting caused them to move west into Courland. An attempt to cross the Baltic to Sweden failed, and the family was evacuated by the German military authorities by boat to Germany and by late October found itself near Dresden. With the support of Kuhn, Alfred obtained a position in the laboratory of Professor Grassman in the Kaiser Wilhelm Institute for Leather Research (an institute famous for pioneering research in amino-acid and protein chemistry), and started work on the amino-acid composition of collagen—a research far removed from the daily realities of food shortages, aerial bombardments, sleepless nights, and broken windows. The family could not find accommodation in Dresden because of the press of refugees from the east, and so it escaped the fire-bombing of 13–14 February, 1945, which obliterated the Kaiser Wilhelm Institute along with the historic centre of the city. The Taurins family started its wanderings again, carrying all its belongings in suitcases and travelling by train or on foot, and finally arriving at Augsburg. Alfred was assigned work as a farm hand, and the end of the war in Europe in May found the family in the American zone of occupation in a displaced persons camp. In August, Alfred began teaching chemistry at a Gymnasium in Augsburg, and in February 1946 he was appointed Professor of Organic Chemistry at an UNRAA university in Munich. Here he lectured until the university was closed in 1947. Textbooks were unavailable, and so he produced two chemistry texts in German and one in Latvian.

After these many tribulations, there came the day in 1948 when he wrote in his diary: "Today I was awarded a Lady Davis Fellowship and can become a scientist again. This is my day of triumph." The Lady Davis Foundation brought twenty-five distinguished scholars and scientists from the refugee camps of Europe and supported them for three years in Canadian universities. Two Lady Davis Fellows came to McGill in 1949: Alfred Taurins and Istvan Anhalt, the distinguished composer.

Taurins came to the Department of Chemistry at McGill University at a fortunate moment, because it urgently needed strengthening in organic chemistry. He started immediately in teaching and research. His first work in the laboratory completed researches on complexes of amino-acids started in Latvia during the war. However, he realized that classical methods of isolating amino-acids had been superseded by the chromatographic methods introduced in the early forties by Martin and Synge, and in 1950 he took up again work on heterocyclic chemistry that he had started in Riga. This field remained his scholarly passion for the rest of his life.

The time was propitious for a reinvestigation of many problems in heterocyclic chemistry, because the practice of both organic and inorganic chemistry was being revolutionized by the introduction of new techniques in spectroscopy. Taurins took the lead in acquiring for the department first an

infrared, and then a nuclear magnetic resonance spectrometer. He spent the summers of 1955 and 1958 as a Visiting Professor at the National Research Council laboratories in Ottawa, learning how to use the new instruments most effectively, and for many years taught graduate courses in infrared, and then in nuclear magnetic resonance spectrometry.

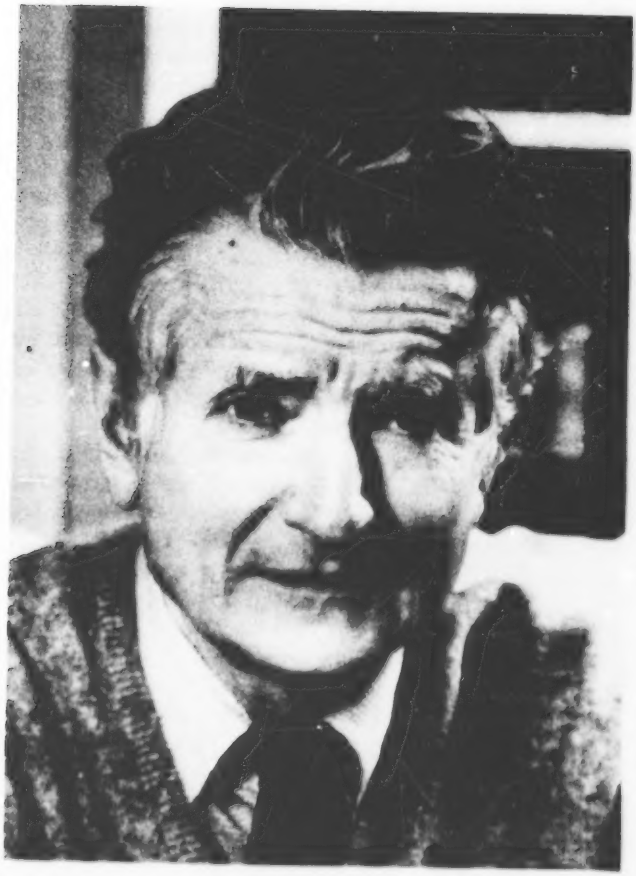
For his researches in heterocyclic chemistry Alfred Taurins was elected a Fellow of the Royal Society of Canada in 1962. In the following year he became a Macdonald Professor of Chemistry, and on his retirement in 1972 he was made an Emeritus Professor of Chemistry. He continued teaching and research for some years more and published his last paper in 1977. In it he applied spectroscopic techniques to revise a molecular structure proposed in 1931 by Fischer, his old professor in Riga, and Wanag.

Like Walden, Taurins had always been interested in the history of chemistry and found more time for it in his retirement. His *Select Bibliography of the History of Alchemy and Chemistry in McGill University Libraries*, published by the McGill Department of Chemistry in June 1986, was the product of many years' work. He was also active in the Latvian Lutheran church and in various Latvian societies in Montreal, and attended annual reunions of his student fraternity in different cities in Canada and the United States. In his later years he derived great satisfaction from the beautiful garden tended by Milija and himself at their home in St. Bruno, near Montreal, and from the careers of his children and grandchildren in his adopted country.

His colleagues remember with affection this soft-spoken and retiring man who served his department selflessly for many years. He is survived by his wife, his daughters Egina and Ilze, and six grandchildren.

ZDENEK VALENTA, F.R.S.C.

Karel Wiesner
1919–1986



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IN RETROSPECT, the year 1948 proved very important for the University of New Brunswick. A 29-year-old Czech emigrant, Karel Wiesner, arrived in Fredericton with his wife Blanche and son Charles to take up his duties as Professor of Chemistry. The university, as well as all accommodation facilities in the city, was overflowing with war veterans at that time, and the Wiesners thus started their life in Canada in a temporary hut left over from the war. Blanche took care of that while Karel went to his laboratory on the first day and, in his own words, "tossed out the broken flasks, dusted off the good ones, and started to look for collaborators." According to the late Frank J. Toole, then the Head of Chemistry Department and later Vice-President (Academic) at U.N.B., Wiesner's arrival was the time when "the clock started" for modern scientific research at the university.

Wiesner chose natural product chemistry as his field of study. He was determined to tackle the most difficult structural problems waiting for a solution in that era and proved to have the qualities necessary for success: the unusual ability to recognize the truly difficult, important problems, the infectious ethusiasm and dedication which soon attracted a large group of hard-working collaborators, and the courage to "climb the highest mountains." Mountain climbing provided some of his favourite analogies for research, as in "and just as the peak comes into sight, you realize that you have to return all the way back to base camp to get more oxygen cylinders. That is the time when you discover whether you have the patience and determination to succeed." Since he was a duck hunter and fisherman in his younger days, hunting and fishing similes also were common. A student who confessed to being worried about the paucity of new data for his thesis dealing with a very difficult problem was told: "You know, you should realize that you will never bag a tiger if you insist on chasing after rabbits!"

With time, the three-dimensional structures of naturally occurring bases (alkaloids) isolated from several club-mosses, from delphinium plants, and from monkshood, among others, were solved. This phase of Wiesner's work culminated in the elucidation of the complex structure of the natural insecticide ryanodine, a monumental achievement which took some nine years and was helped in its last stage by nuclear magnetic resonance spectroscopy in its unsophisticated, late 1950s form. These accomplishments firmly established the international reputation of the U.N.B. school. Furthermore, Wiesner undoubtedly played one of the key roles in the creation of world-level organic chemistry in Canada. Until the mid-1950s, a high research level in this discipline was reached by young Canadians mostly at universities abroad. Wiesner established one of the few laboratories where such a level could be attained at home. As one of the consequences, some fifteen organic chemists who are presently faculty members at Canadian universities have at one time been Wiesner's collaborators or students of one of his former collaborators. Many others hold responsible positions in industry or in government laboratories or in universities and research establishments abroad.

Karel Wiesner gained prominence in organic chemistry; his scientific career,

however, did not start in that discipline. The Prague universities were closed during the German occupation of Czechoslovakia. Working in a home laboratory and in the modest research facilities of a Prague hospital, he became an essentially self-taught physical chemistry researcher. Without direction, he developed a method for the measurement of certain very fast reactions based on the work in polarography by Professor J. Heyrovský. As he was fond of saying with a twinkle in his eye, the regulations followed in granting him a doctorate in physical chemistry in 1945 for this study did not necessarily "include an adherence to all the rules and regulations existing at the time." Nevertheless, it should be added here that Wiesner felt that his work in Prague may well contain his most important, if largely overlooked, scientific discovery.

It is not completely clear why he made the decision, at the end of the war, to change direction and become an organic chemist. It may well be that "the jungle," the unexplored part of organic chemistry, appealed to his adventurous spirit. In any case, there is no doubt that he always considered qualitative progress in science more important—and more interesting to him—than advances in quantitative understanding. Two years of apprenticeship in the laboratory of Professor V. Prelog at the E.T.H. in Zürich (1946–48) proved sufficient preparation for his debut in Canada.

To return to his career as a Canadian organic chemist, Wiesner became convinced in the early 1960s that advances in the power of spectroscopic methods completely changed the nature of the discipline of structure elucidation and that, by his own preference, a change in his own interests was consequently in order. There followed a long period of total synthesis, that is, preparation of chosen complex organic substances from simple, commercially available compounds. This "molecular engineering," as Wiesner often called it, was accomplished with virtuosity, patience, and vigour comparable to those demonstrated in the previous phase. His syntheses of diterpene alkaloids, developed in "generations" (waves of attack) of ever increasing efficiency, will forever remain as one of the monuments of synthetic achievement.

Finally, the last few years of his research career (and, alas, his life) represent an expression of Wiesner's life-long interest in pharmaceutical chemistry and in its application for mankind. Following his initial study in the Ayerst Laboratories in Montreal where he was the Associate Director of Research at one time (1962–64) and basing their plan on the model of the drug digitalis, a widely used heart regulator, he and his research group succeeded in preparing new chemical derivatives of digitalis with a significantly improved ratio of beneficial activity to toxicity.

He liked to call himself a back-woods chemist, particularly in introductions to lectures at august international gatherings or in expressions of thanks for the many national and international prizes and honours which he received. Karel's example of single-mindedness of purpose, dedication to work, striving for high quality, and teaching by example will never be forgotten. Furthermore, every day of his life in Fredericton made his self-imposed designation of "back-woods chemist" less believable and he well knew it—and enjoyed the thought.

Appendix

DAVID BRAYBROOKE*AND GILLES PAQUET†

Human Dimensions of Global Change: The Challenge to the Humanities and the Social Sciences‡

At the Royal Society
(End of the Millennium)

Whoosh goes the ozone layer, still much of it is left;
Whatever is to be seen better be seen soon
While the seeing is good.

Bang explodes the population, still a few spots are left;
Whatever is to be known better be known now
While the knowing is good.

Squirt spreads the inkblots of AIDS, little love is left on the map;
Whatever's to be embraced better be embraced
While the embracing is good.

D.R. Suvin (written during the workshop of 4 June 1987)

"It would be quite enough to keep open for our descendants as wide a range of alternatives as our ancestors left for us, to solve enough of the problems that come along so that our children and our children's children will not find themselves boxed in anymore narrowly than we were."
Herbert A. Simon

* Professor of Philosophy/Political Science, Dalhousie University.
† Dean, Faculty of Administration, University of Ottawa.
‡ This is a compendium of remarks made by the authors at the meetings of 3 and 4 June 1987 and of comments made by the participants in the workshop of 4 June. Both meetings had been organized under the auspices of the Royal Society of Canada within the context of their annual meeting in Hamilton. The 4 June workshop—"Managing Global Change"—was held thanks to a grant of the Social Sciences and Humanities Research Council of Canada (SSHRCC).

1. INTRODUCTION

In December 1986, we took part in the deliberations of the Canadian committee of colleagues from natural sciences (pure and applied) charged by the Royal Society of Canada (RSC) with developing a Canadian contribution to the International Geosphere–Biosphere Program (IGBP) (Fyfe 1985). This program, sponsored by the International Council of Scientific Unions (ICSU) will foster efforts to describe and understand the physical, chemical, and biological processes that regulate the total earth system (ICSU 1986).

It became obvious during those discussions that the human dimensions of the problems of global change—impact, perceptions, conceptions and framing of issues, response—needed more systematic attention. Pressure had been put on ICSU by Canadians and others to broaden the scope of the program to include human dimensions. This suggestion was not accepted. Yet nothing less than a parallel program dealing with the human dimensions of global change could do the job (McLaren and Skinner 1987). At the December 1986 meeting, a letter of Ian Burton, Director of the International Federation of Institutes for Advanced Study (IFIAS), acquainted those present with "a move to establish a new international program on the theme of human response to global change" (letter of 8.12.86). Given such a program, could the Royal Society of Canada lead into it a Canadian contribution?

It was agreed that funding to explore this question would be sought, that a rapid survey of relevant work in progress in Canada on this general problem area would be carried out, and that a workshop would be organized at the tail-end of the RSC annual meeting in Hamilton to draw up a plausible agenda for social scientists and humanists of research themes pertaining to global change.

Funding was obtained from the SSHRCC; a circular was sent to 143 deans of administration, arts, humanities, law, and social sciences. A group of social scientists and humanists from various fields were invited to take part in a workshop on 4 June 1987 in Hamilton. (The list of participants in the workshop is appended.) In the next section, we sketch the broad human dimensions of global change as they were presented to workshop participants and we report the results of our preliminary survey of work in progress in Canada on this front. Our surveys have been limited in scope. They fall short of exhaustively reporting relevant studies in progress. Nevertheless, we draw some inferences from them.

In the third section, we attempt to synthesize the results of the workshop of 4 June under three heads: some embarrassing questions, a number of proposals, and an agenda for work to be done over the next year.

2. HUMAN DIMENSIONS OF GLOBAL CHANGE

It is not possible to study global change, i.e. the major transformations experienced by the planet, without explicitly introducing human dimensions

into the picture. The spaceship Earth is not simply a mix of physical and chemical processes. It is inhabited by active human beings and it is constantly transformed by human action. Environmental changes impact powerfully upon human beings and trigger in turn reactions from humans in attempts to cope with the impact.

The new scale of interaction between environmental and social forces is at the core of the problems presently worrying observers of global changes in the earth system. This scale has increased considerably over the last century and is likely to increase yet more dramatically over the next century as the level of industrial activity, which has increased 100-fold over the last century, goes on rising (Brown et al. 1987).

The pressure of population growth has been underlined but, as Barbara Ward put it in her essay *A New Creation?* in 1973, "the combined impact of numbers, energy and technology imply some colossal risks of disruption. Only with the utmost care and knowledge could the possibility of harmful side effects have been avoided. But throughout most of the period of rapid technological development in the last three centuries, knowledge has been inadequate, care no more than intermittent" (Ward 1987: 11). There have been for years forewarnings that major disruptions going far beyond the harm that has already been done are imminent (Ward 1971) but we still do not have self-correcting mechanisms powerful enough to take us away from the brink.

The first question one is led to ask, in the face of such concerns, is what sort of *usable knowledge* social science research might produce that will help us understand better the large-scale interactions between development and environment and therefore help us manage those interactions:

- knowledge relating to human purposes, about the environment (environmental assessment) and about the interactions between the physical and biochemical spheres;
- knowledge about human development (demographic, geographic, and socio-economic);
- knowledge about the interactions between development and environment.

Foremost in the picture is *technology*. Technology is regarded as the culprit by some—it is the source/cause of the problem; others regard technology as the solution. Technological innovation is not only creating new technical possibilities. It is also a powerful social presence in other ways: it mobilizes some powerful interest groups whose fate depends on the dominium of that technology. Institutions emerge to support those powerful interests and a collusion of some technological imperatives and of some social interests ensues: "significant technologies shape the societies that employ them" (Clark and Munn 1986: 13).

Another crucial factor consists of *values*. Man transforms the environment in the pursuit of foodstuff, fibres, narcotics, or industrial crops for survival or for profit. Culturally, human attitudes and values encourage exploitation of natural resources (Spoehr 1956). Technological innovation is put to use to carry out

this exploitation ever more effectively but in the unintended consequences of such actions figure important, often unwelcome surprises. As a consequence, technology changes the options available. When options are changed/expanded, even the values guiding choice between them may change (Mesthene 1970).

The third factor consists of sets of rules, the *institutions* through which compromises are hammered out between environment and development, between technology and values. Those institutions may be simple customs or religious beliefs or legal systems or international organizations: it falls to them, whether designed for this purpose or not, to regulate the interaction between the exploitative forces behind human development, on the one hand, and the integrity of the environment necessary for sustainable development, on the other.

"Global Change," in the perspective of human concerns, is a label used to identify environmental problems (population explosion, chemical poisoning, acidification, deforestation, greenhouse effect, etc.) emerging on an unprecedented scale and proceeding at an unprecedented speed as a result of interaction between technological innovation, the preponderance in industrial society of values that regard pollution and congestions cost as external to the enterprise and therefore as not to be included in the price of goods for sale (Ward 1987), and lapses on the part of institutions, which often appear readier to sanction unprecedented decay rather than to prevent it.

A. *Basic questions*

Before one can tackle the problems raised by the Global Change agenda, it is crucial to understand that the findings or data invoked by natural scientists to support their plea for heightened concern still fall short of being *uncontrovertible evidence* that a crisis exists. Many aspects of these issues have not yet been fully or even sufficiently documented. This has been the source of many doubts and of suspicions warranted and unwarranted. The program Man and the Biosphere (MAB) of UNESCO faltered because of a lack of reliable and usable knowledge (i.e. lack of information, failure to frame issues in a sufficiently persuasive way to trigger meaningful action). The degree of ignorance and uncertainty that is still prevailing about global issues is such that little can be asserted with full assurance. It is not unreasonable for many to ask how one can hope to do anything about problems about which we know so little with so little certainty.

Even if the facts could be established more firmly, this does not mean that the global risks they point to will be perceived as such by the population. *Risk is a cultural concept*: existing institutions select problems and risks worth taking into account. The institutions doing the recognizing and the classifying may systematically disregard problems that would threaten values or deconstruct institutions. This is called *structural amnesia* (Clark and Munn 1986: 433). Consequently, even if the facts are confirmed, there is no assurance that they will become socially defined as problems worth worrying about (Douglas and Wildavsky 1982; Douglas 1986).

Assuming that those problems exist and that the risks ensuing from them are socially recognized, *are the problems soluble?* Even if they are (in principle), is our capacity for processing issues such that we can deal with such problems? In particular, are we not saddled with disciplines that have put aside "big questions" because of the threat they pose to their legitimacy? It is not unfair to say that the disciplinary organization of social science has led to myopia and tunnel-vision and consequently to a sort of paralysis of science in the face of "big questions" (Beam 1983).

To cope with the issues of global change, we may have to develop a *new scientific style* and a *new notion of scientific/scholarly quality*. Nothing less than the development of a "trans-science" might be necessary. Trans-scientific questions cannot be answered by science: they transcend science. Engineering and much of policy sciences are plagued with such questions: answers may be impractically expensive, the subject-matter too variable for scientific canons to apply, moral and aesthetic judgments may be involved, etc. (Weinberg 1972). The new understanding has to be constructd on "usable ignorance"—"by being aware of our ignorance, we do not encounter disastrous pitfalls in our supposedly secure knowledge or supposedly effective technique ... institutions should be designed with the ignorance factor in mind, so that they can respond and adapt in good time" (Collingridge 1982; Ravetz 1986).

Finally, the *national and supranational institutions needed* to cope with the issues are not in place. Pieces of the overall institutional framework have been mounted by different governments and a large number of competent persons work within those structures. But the present structures do not suffice to do the job. Managing—simply coping with—global change means nothing less than creating the requisite institutions and managing them. These institutions will do the job if they focus the attention of the population and their emotions on long-run, large-scale issues and if they provide mechanisms for strengthening the role of reason in social choice (Simon 1983). The construction of such institutions is an exercise of social architecture that challenges the powers of social sciences and humanities (Sandler 1980).

B. *Work in progress*

Social scientists and humanists in Canada are already doing a lot of work that bears on these questions. We have not been able to reach out in all those directions in the preliminary surveys we have conducted. Consequently, we must underline the fact that we have not generated a comprehensive picture of what is going on. Our focus has been mainly with the academic community rather than on government agencies, action groups, and not-for-profit organizations, all of which have been active. Even our picture of the academic community is incomplete.

(1) A snapshot of the research funded by SSHRCC

We have taken an inventory of the topics related or relatable to the IGBP that can

be found in the lists for the last three years (1983–84, 1984–85, 1985–86) of research grants awarded by the SSHRCC. This is only a very rough, probably unbalanced review of research currently in progress in Canada in the academic community. Our inferences from it are very primitive also, based as they are on guesses about what the short titles of projects listed mean.

Unreliable as the results may be, they may prompt some useful reflections.

(a) There are a number of projects bearing directly upon topics to be taken up in the scientific program of IGBP: studies of the operations of primary resource industries (agriculture, forestry, fisheries, energy); studies of social policies regarding the exploitation of natural resources. Some studies also, although less frequent than one might have expected, bear upon the impact of industry and urbanization on the environment. There is even one broadly conceived program of research on "institutions and natural resource use."

(b) There are studies on the processes through which geoscientific information is fed into public policy and of the character of public participation in environmental policy making.

(c) There are projects studying human impacts on the environment in other countries: third world countries, the technology-international-relations nexus, comparative policies in areas such as forestry management.

(d) Other projects can easily be adjusted to run hand-in-hand with the IGBP program. For instance, (1) studies of *aboriginal exploitation of natural resources* provide various models of how humans could deal with the environment harmlessly; (2) *mass media studies* (criticism, reception, personnel, and content) might hold much in store for those who wish to understand the process through which global change issues will reach the public consciousness; (3) studies on the *impact of education on attitudes* might be particularly useful in the same connection. Finally, (4) work, which may turn up findings generalizable to public concern with global environmental issues, on *human rights and foreign policy* and the links they have with public opinion.

(e) In many fields of the social sciences, the SSHRCC lists offer nothing that easily relates to issues of global change. Such silence is especially arresting in fields like architecture and design, criminology, and the like. Half the world population will live in cities by 2000 AD. One would expect architecture and design to look at ways to make this urban environment agreeable in itself and as harmless as possible to the planet. Criminology might be looking at the techniques for controlling crimes against the environment—vandalism, negligence, rights-violations. To the extent that one may wish to use *rights* as a device to deal with global change, one might also look to philosophy, religious studies, and law for contributions, though their contributions would not stop there.

(f) Silence in the social sciences is one thing. Equally arresting, and maybe more deeply disturbing, is the silence of the humanities proper on global change in the SSHRCC lists. Martin Amis has cited E.L. Doctorow as explaining the absence of attention in fiction to catastrophes like nuclear holocausts by

maintaining that such things trivialize the themes of fiction—personal ambitions, personal choices, personal lives (Masters 1987). However, such catastrophes—we expect, ecological ones as well as nuclear—have been treated in science fiction, not all of which can be unworthy of attention by students of literature. There have been songs about nuclear dangers: not just Vera Lynn singing "We'll meet again" in the final scene of *Doctor Strangelove* during the air strike against Moscow; Tom Lehrer singing "We'll all go together when we go"; and the Seekers asking "What have they done to the rain?" Though the Seekers had radioactive fall-out in mind, their song applies poignantly enough to other forms of pollution. Pollution and the other issues raised by global change can be the subjects of poetry. We might wonder whether the issues have been brought home to our deepest levels of feeling, if poetry, focusing feeling in language more concentrated than is ever found in the social sciences or in prose discussions of policy (like the present discussion except for the interlude forthcoming), does not take the issues up and bring them home. We offer two examples: besides Suvin's poem—one of our epigraphs, written on the spot during the workshop and hence the earliest reaction in literature to the RSC effort mobilized at the workshop—the following poem by Mary Kinzie reprinted by her kind and generous permission (from *The Threshold of the Year* [Columbia, Mo: University of Missouri Press 1982], p. 9).

Claude Lorrain's "Herdsman," 1655

This is a different sort of heaven.
Man is lying on his back.
Nothing's done that can't as well
be done by things left to themselves.
That Claude is preindustrial
seems odd, for there's the smoke and steam-
mechanic haze at afternoon
upon the glade and river's bed,
the dying branches of the sapling
with some feathered sprays of green,
the brown and browner residue
industry
has painted on the ancient screen.

Environmentalists describe
the Armageddon of the mills
and mines at Bethlehem and Gary
as seductive sylphs of sulfur,
coal, petroleum, and steel
rising from edenic lakes

veiled in scarfs of effluent
motley as an engine slick—
God's anger spent
on a covenant
whose rainbow fans it stroboscope
above the cities where we breathe.

But air is only dust and dung
in Claude: the cows have worn the branches
form their bark (the ground is bright
from their plodding ambulations);
and far off to the right a new
Jerusalem
where granite risers fit the feet
and streets heal over gaps in conversation.

(2) Preliminary results of our survey of deans

When we surveyed Canadian deans in the spring of 1987, we gave them too little time to be sure of an abundant response. Consequently, we cannot be sure that we have from them either an exhaustive list of relevant ongoing projects in the different faculties of social sciences, law, management, and arts in Canada. However, we have been able to identify a variety of initiatives and interested parties. They are presented here again for illustrative purposes in order to show that already much "trans-science" is going on in Canada. Like the SSHRCC lists of grants, the survey suffices to establish that Canadian social scientists and humanists are likely to be able to contribute significantly to an international project dealing with the human dimensions of global change and the managerial challenges they pose.

(a) One major project has been launched jointly by the Faculté de l'Aménagement de l'Université de Montréal and the Faculty of Environmental Studies at York University. It corresponds to a long-standing arrangement focused on future studies and environmental issues. This group has paid a lot of attention to the necessary social architecture and institutional strategy needed to cope with critical national and world situations. As early as 1969, the group had prepared for the Special Committee of the Senate of Canada on Science Policy a working paper on Canada in the year 2000 (Chevalier, Cartwright, and Desbarats 1969). More recently, they have produced a number of working papers on world perspectives of common concerns (Chevalier and Vallée 1987). Paramount in the concerns of this group is the primacy of reformulating our conceptual framework along transdisciplinary lines to deal with meta-problems—that is a complex nexus of interrelated problems like poverty that are ill-structured and cannot be tackled or "solved" in the sense of being done away with by scientific means (Chevalier 1967)—and organizing and instituting an adaptive planning strategy to deal with them.

(b) Much experience has been acquired by Canadians working on international projects in dealing with meta-problems. Without meaning to exclude other expertise, we might conjecture that the most experienced of the academic groups operating in this area is Institut GAMMA. It has been working since 1974 as an inter-university research group (Batlle 1986: Ch. 2).

(c) Another important line of relevant work in Canada is *common property resources*. This work was pioneered in Canada by Scott Gordon and Anthony Scott in the 1950s. It deals with the *property interface*—the boundaries between physical and social dimensions, the extent to which property rights may be defined and assigned to resources, and the extent to which resource allocation mechanisms may be designed to ensure efficiency (Dales 1968). This work is not done at one place in Canada; one may think of it as being produced in a *network* of loosely connected scholars from economics and law. Important nodes in this network are the Programme in Natural Resource Economics at the University of British Columbia, the Law and Economics Group at the University of Toronto, the GREEN group at Laval, and the research group in environmental law at Dalhousie University. A large number of scholars all through the Canadian university system are working on these issues.

(d) A fourth major thrust comes from the work of geographers who stand at the boundaries of physical and social sciences. Their work is often more descriptive than theoretical, but it is also more ambitious in the sense that it encompasses both large-scale and long-run phenomena to a much greater extent than does the work of other groups of social scientists. Geographers have also defined systemic world-views and made use of new methods of large-scale observations through remote-sensing technology. They have furthermore combined with anthropologists and archaeologists to analyse climate-resources-culture relationships. There are many loci of such work in Canada, again connected in a loose network.

(e) We should mention, in the fifth place, initiatives to define *alternative conceptual frameworks*: Common Cause (Russel 1987), the Cost of Inaction Project (Cordell 1987), Science Policy Foundation (de la Mothe 1987), Ethique de l'environnement (Dansereau 1983). All those frameworks involve a variety of social scientists from different disciplines in an effort to promote a more sophisticated "science culture," greater public awareness of global change issues, and a greater commitment to research likely to enable Canada to take action now to prevent or at least to lower the probability of occurrence of the worst potential outcomes.

(f) Philosophers have probably been the humanists most interested in issues of global change. They have not only raised questions of ethics but also provided some work in political philosophy that offers suggestions about the new institutions needed to respond to global change and to cope with it (Pestieau 1973).

(g) Another research program has developed under the guidance of Arthur Kroker to explore the nature of the *Canadian public discourse* as it pertains to

the difficult interactions between technology and culture (Kroker 1984). Political science and public administration have been under attack for not having taken the lead in furnishing principles of social architecture for the design of national and supranational institutions to deal with global change. On this point, political scientists may be changing. Another thrust in work by political scientists has been the recognition that values, religious values in particular, may have an important role to play in efforts to deal with environmental crises (Dwivedi 1986, 1988).

(h) Finally, comparative literature, science fiction studies, sociology, and linguistics have dealt with *images* of global change, and with the differences between cultural sensitivities to them. They have given attention to the exploration of utopian worlds. They have considered the clarification and purification of languages-of-problem-solution and languages-of-persuasion. All of this relates to global change issues, since the central problem in effecting the required policy changes remains the difficulty in *framing in a suitably connected way public perceptions and political decisions* (Shelly and Bryan 1964; Suvin 1979; Cazes 1986).

3. CAN WE COPE WITH GLOBAL CHANGE? HOW ARE WE TO COPE?

A major question that these quick surveys suggest is how far our traditional conceptual frameworks, especially those governing our values and reflected in the rules of our institutions, have become obsolete. Are they broad enough to encompass the issues of global change? Do they reach far enough into the future? They may take our freedom to exploit nature too much for granted (Passmore 1974); or fall short, not only of leading us to consider fully the consequences of our actions for future generations, but even of recognizing that our actions will affect the size and composition of those generations (Parfit 1984). Neither political theory nor the political science of our present institutions has yet succeeded in bringing those generations into the process that leads from public concern to steady commitment in policy.

A clear impediment to our taking into account the long-run impacts of global change is rooted in the *disciplinary bias* of humanities and social sciences, which is much more crippling than the one already present in the natural sciences. Another related impediment is the *short-run bias* of our institutions. One of the tasks must be to free our human sciences of their disciplinary shackles and to find a way to make our institutions sensitive to long-run issues. This will not be done by decree or by mass brainwashing but by reaching opinion leaders in many different positions and introducing changes in the structure of policy-making processes. On those matters, humanities and social sciences have much to contribute.

A. *Better information*

Every plan, and hence every plan to cope with global change, must rest on five sets of propositions (Greniewski 1962):

- statements about the present state of the world,
- statements about future states of the world,
- statements about the given rules of the game,
- statements about goals to be pursued,
- statements about actions to be undertaken.

There is much need for elaboration and clarification of information on all these fronts. For the time being, our ignorance is great on all these counts. Social sciences and human studies may be of help in providing this additional information and a machinery for its quality control. We do not have in Canada independent institutions charged with gathering, sifting, appraising, and evaluating information about *futuribles*. For the time being (as was mentioned earlier) our ignorance is such that any policy design must be based on very imperfect knowledge—usable ignorance. A first priority, in any meaningful research program, would have to be a mammoth effort to gauge the best available information and to make it widely available.

B. *More adequate evaluative frameworks*

None of the information will lead to helpful policy unless one is able to apply it to policy choices within conceptual frameworks well adapted to the task at hand. In the midst of the ignorance and uncertainty that as yet permeates the whole discussion of issues of global change, the sort of "guesswork with a view to decision" that we need may have to come forward not within elegant frameworks, but within very rough and ready ones. We need to develop a small number of scenarios around which the diffuse efforts of Canadian scholars might coalesce. It is important also to encourage a variety of exploratory studies before one anchors a research program into one exclusive framework.

Much of what has been said about benefit/cost analysis (good and bad) is probably right: it is "a jungle of assumptions, postulates and formulae" but it is often the only tool adapted to the situation (Hammond 1966). If one aims at managing global change, quite a bit of additional work is necessary to develop new ways to process complex issues with the requisite amount of rigour (Braybrooke 1974).

The new understanding required to manage global change must embody a concern for *prospects* (defined either by scenarios, by key variables, by trends, or by expert panels) and a concern for *strategic planning*. Neither of those components have good press or even a modicum of respectability in the opinion of most social scientists and humanists. They correspond to pragmatic efforts to make sense of complex and uncertainty-ridden issues (Braybrooke and Lindblom 1963).

C. *New purpose-built institutions*

There is a need to introduce into the present complex of policy-making institutions (in Canada but also on the world scene) new institutions capable of acting as gyroscopes—specialized guidance systems—on issues of global change. Nothing less probably will succeed in making "the future a matter of public opinion" as Bertrand de Jouvenel would have said. The institutions should be purpose-built, not only because they have purposes to serve going well beyond the purposes entrusted to our present institutions, but also because purpose-building them would give them a degree of novelty that would help catch the public eye. This is not to say that they are not to be hooked into our present institutions. They must be hooked in if they are to be effective. They must have the power not just to get attention from the Cabinet or Parliament in favourable circumstances; they must have, sooner or later, the power to arrest attention, even to initiate action.

One way of accomplishing these things would be to transform (purpose-rebuild) an existing institution: the Senate of Canada may be susceptible to such a transformation, becoming a *Council of Social Values* (Paquet 1968). Or perhaps, after some experience with a proto-institution with the power only to fund research and make recommendations, a new *Committee on the Long Run* might be added to the Senate and the House of Commons and given powers to bring legislation into Parliament that Parliament would have to attend to as a matter of top priority; and powers, too, at least to require further votes in Parliament on legislation that the committee considered injurious. Perhaps the most feasible plan—and one that given present discussions about changing the role of the Senate might have a reasonably good chance of adoption—would be to combine these suggestions, so that a Committee on the Long Run becomes a committee of the Senate, preparing for that body the business with which it would become specially preoccupied.

In the membership of the Long Run Committee, humanists and social scientists would predominate, but the committee should also include one or two natural scientists and experts in public education and public relations. If it is to be a committee of the Senate such people would be specially appointed senators, like the judges made law lords in Britain.

Obviously, such institutional innovations would not be easy to accomplish; but the very discussion of these possibilities may guide us to more feasible institutional innovations that would have much the same effect. Whatever the form chosen, such institutions would ensure that long-run, large-scale issues are on the agenda of public managers and paramount in public consciousness. They would have a steering effect on all aspects of public decision-making in the country. They would also do much to ensure a *fair dialogue* about issues on which, for the moment, no real debate or dialogue is possible for lack of a forum. One would expect such institutions to play a prominent role of public education on matters where policy decisions or predictable trends in the environment would point to the costs of *irreversibilities* and to the costs of

inaction upon certain key dossiers. Finally, it would generate the sort of mobilization of the population necessary for such issues to be fully aired and discussed and for policy decisions to be taken and put into effect promptly (Godet 1985).

4. DISCUSSION AT THE WORKSHOP

On the basis of this general background information, the 4 June 1987 workshop proceeded. To guide the discussion, special use was made of a background paper (Burton and Timmerman 1987) prepared for the planning meeting of IFIAS on its program Human Responses to Global Change (HRGC) was highlighted. It raised a few simple questions: should it be coupled with the IGBP program closely? how should it be organized? what should be its timetable? what projects should be supported by such a program?

A. *Current omissions and embarrassments*

The discussion on 4 June was an attempt to do some stock-taking while appraising critically the capabilities of human sciences in the face of issues as big as global change. Many of the conjectures developed through our surveys were confirmed.

(1) Missing models

First it was felt that, even though much systems thinking is going on, especially in economics and geography, we are still missing an *appropriate* model of man and *useful* models of large-scale long-run phenomena. The general agreement appeared to be that a baseline case is needed: what is likely to happen if we do nothing. Such a case should be built on a realistic appraisal of the breadth of interests of human beings, of their passions, of their capacity for rational choice, and of their capacity for perverse or counter-intuitive behaviour. Philosophers and economists spent much time reminding the group of the adaptive flexibility of human beings and of their satisficing behaviour. Geographers underlined the ill-structured nature of the problem of global change. The central difficulties in arriving at appropriate modelling have to do with *irreversibilities*—i.e. processes of cumulative causation—and *discontinuities*—i.e. processes leading to qualitative change.

Neither simple linear trends à la Club of Rome nor stable well-structured mechanistic models will do. A more promising route would appear to be the one followed by the International Institute for Applied Systems Analysis—building a few scenarios to complement the baseline case.

(2) Poor data

A great source of concern has been the lack of reliable information and the poor quality control on whatever information has been produced. The false impression of certainty generated by the round of numbers battered about and

the sense of panic induced by these numbers do not foster serious analyses. There is at the international level a lack of agreement on measures which is greater in this field that in most others. It was strongly held at the workshop that this difficulty should be overcome through a major effort to develop a sound data base and a broad capacity to integrate and diffuse such information.

It is hoped that IGBP will contribute to the solution of these data problems in the realm of its inquiries; but a complementary and equally strong program is necessary on the humanities and social sciences side. Much of this data gathering and consolidation will require a serious attack on myths and misunderstandings. There will also be a need for better use of new techniques like remote sensing and image analysis. The efficacy of the information and education processes depends on a solid factual basis, which remains to be built. Even the simplest demographic trends are poorly documented and misleadingly and wrongly appraised by many without regard to background knowledge of demography.

(3) The misframing of issues

There was much concern expressed by human scientists about the way in which the global change issues have been framed. The sort of "panic logic" that characterizes current discourse on the subject is based on an "uncritical acceptance of a sort of technicist philosophy." Some felt that the key role of the human sciences might have to be mainly of a critical nature. While others were not as radical in their critique, there was a clear undercurrent of dissatisfaction with the manner in which the issues had been framed. The somewhat mechanistic manner in which the broad issues have been cast by many hurried experts might explain why they have failed to ignite any real interest in the population. Much mention was made of the need to understand better the link between psychology and public policy. In many ways, the lack of a satisfactory model of man may lie at the root of the apparent incapacity to mobilize the population on the subject of global change. The central information-dissemination and education functions depend centrally on a capacity for framing those issues properly. Social scientists and humanists were seen as having a central role to play here (Tversky and Kahneman 1981).

(4) How far can managing go?

Grandiloquent projects of management of global change would be, it was held, both vacuous and useless. A pragmatic program must work with modest experiments: detailed impact studies of global changes on society and human life, similar studies of well-defined institutional changes impacting on the ecosystem.

In particular, a detailed examination of the history of environmental policy and of the operations of certain underappreciated institutions which would appear to do part of the "regulation" job rather well (e.g. the Canadian regulatory system for toxic chemicals) might be a useful way to begin. Another

suggestion was to partition the complex of issues labelled Global Change and to deal with only a portion of the problem at first (e.g. the Arctic, terrestrial, atmospheric, aquatic, health) as a way to ensure that the problems would be kept on a scale likely to lend themselves to policy-applicable analyses.

Managing global change was seen as somewhat ambitious for now: no tidy deliberate strategy can be formulated at present. Yet, emergent strategies (patterns in streams of decisions or actions emerging from the organization without a priori articulation of intention) might be possible (Mintzberg and Waters 1983).

(5) The odd coupling with IGBP

It appeared necessary to launch a program of research on the human/cultural/managerial/biological aspects of global change. It was also clear that to conduct such a program in complete isolation from IGBP would not be very efficient given the central importance of physical/chemical processes in global changes. However, it also appeared dangerous to all to allow IGBP to dictate the structure of any overall research program on the human/managerial dimensions of global change. The past experience of humanists and social scientists in dealing with natural scientists was cited by many workshop participants as ground for fearing that the contribution of social sciences and humanities was in danger of being marginalized.

The Royal Society of Canada has perceived this danger very early and the rationale for sponsoring a *comprehensive approach to global change* is a clear assumption that the natural sciences and social sciences-cum-humanities will be complementary in their approaches. It was felt that it would be essential *organizationally* to link up any Canadian program on this front with the IGBP-Canada group but also with the work of other agencies already engaged in such work at the international level: UNESCO Man and the Biosphere, the Sustainable Development of the Biosphere of the International Institute of Applied Systems Analysis, Karl Deustch's Globus project, the Bariloche anti-Club of Rome simulation exercise, the budding research program of IFIAS, etc. This meant that there would have to be a rather close and dangerous coupling with IGBP.

B. *Proposals for action*

During the workshop, a variety of suggestions and proposals were put forward. Instead of making a complete list of all of them with their idiosyncrasies, we have chosen to mention the generic proposals that appeared to have generated most support during the discussion.

1. There was strong support for the creation of an *action committee* whose main purpose would be to orchestrate the information gathering and its dissemination to politicians and the public.

2. There was support for the idea of a *secretariat* that would back up the organization of a Canadian research program on the human dimensions and

managerial challenges of global change. There was also support for the view that this secretariat should be located in the Royal Society of Canada.

3. There was strong support for the view that practical use should be made of all existing international networks involved in global change issues with the expectation that in so doing the Canadian project would be better assured of some impact without running the risk of being constrained unduly by any one such organization.

4. There was a strong priority given to the history of environmental policies and the examination of *cases* and *institutional experiments* as a good way to develop the expertise and the knowledge base necessary for useful policy development.

5. Despite a great deal of uneasiness about the poverty of the existing models, it was felt that a serious exercise to develop the *base case* of what would happen if social sciences and humanities did nothing should be also an important priority.

6. It was felt that the Arctic should be considered as a major case study of interest.

7. It was regarded as crucial to develop a better knowledge base of what the social sciences and the humanities had to contribute to the study of crises, catastrophes, and global change issues. It was also felt that there should be an input of the social sciences and humanities in arriving at the priority order of research topics in IGBP (Canada).

CONCLUSION

From the discussions and deliberations of the workshop, one can infer both an agenda for action and some forewarnings about the difficulties one is likely to encounter in developing this action plan.

A. *An agenda*

1. The distribution of a report on the June 1987 workshop to the participants during the summer and its publication in the *Transactions of the Royal Society of Canada*.

2. The creation of a *Secretariat* at the Royal Society of Canada.

3. The setting up of a *Temporary Follow-up Committee* for the Hamilton workshop (to exist only until June 1988) charged with preparing the terms of reference for the secretariat and for committees to be set up with permanent functions.

4. The creation of a *Steering Committee* under the chairmanship of a senior Canadian academic. This committee of five to seven members would overview the work of two working committees:

(a) the *Research Committee* charged (1) with preparing a report on the potential contributions of social sciences and humanities to the study of global change issues; (2) with developing a research agenda for the Royal Society of Canada program on the human dimensions of global change (both those tasks are to be

completed by June 1988); (3) with preparing a list of keenly interested parties and an invitation to them to prepare specific research proposals to be vetted by the Research Committee and directed to the SSHRCC and other agencies as a package of projects before June 1988.

(b) the *Action Committee* charged (1) with the task of sifting existing evidence with a view to identifying the central risks and costs associated with global change for Canada and (2) with the task of reporting the results of their investigation to the IGBP Canada Committee by June 1988. This preliminary assessment of the human and social costs of different aspects of global change should be prepared so as to be taken into account by IGBP-Canada in arriving at key priorities in the natural sciences research program.

Before long—say, before the end of 1988—the Action Committee might absorb the Steering Committee and the Research Committee. Thus strengthened, the Action Committee might deliberately aim to serve in membership and function as a prototype of a constitutionally functioning Committee on the Long Run. That is to say, it would strive, so far as an organ without constitutional powers and in no position to usurp them could, to fill the gap left in our present complex of policy-making institutions by the absence of such an organ and by the short-run bias of the institutions that do exist. We assume that the social sciences and humanities will be called on, by the Committee itself, to specify the nature of this bias more precisely than has been done up to now.

5. The development in January 1988 of a symposium on "The Costs of Inaction" with the collaboration of the SSHRCC, Environment Canada, the Science Council of Canada, etc.

6. The development by the Steering Committee of a symposium on "Values, Environment, and Institutional Design" in the fall of 1988.

7. The organization by the Steering Committee of a plenary session at the annual meeting of the Royal Society of Canada in June 1988 to report on the progress of both the IGBP-Canada and IFIAS-HRGC Canada programs and on the Royal Society of Canada program on the human dimensions of global change.

B. *Parting remarks*

Are a significant number of Canadian scholars in the humanities and the social sciences ready to take an informed interest in issues of global change? to take up the challenge? The disciplines do not much encourage broad studies of a transdisciplinary nature or the tackling of "big questions." Consequently, something like a revolutionary reorientation of the mind of some social scientists and humanists may be called for if a program such as the one envisaged above is to succeed. Given the lack of adequate infrastructure to manage this reorientation, the Royal Society of Canada will have to act as a pro-active broker/animateur at least in the first instance.

What we need, urgently, is the right concentration of conviction among people distributed at strategic points in our institutions; or put another way, we need a focus of strategic points, in our present institutions or in modified ones,

that will enable some feasible distribution of conviction to work to the end in generating effective policies. Thus the challenge of global change implies two complementary lines of study: the distribution of convictions and the means of change; the loci of strategic points—reliable routes through strategic points—to effective policies from findings thrown up by the natural sciences and the human sciences working in some combination not too loose to be mutually stimulating.

A full program of research cannot be spelled out at this time but it is likely that one can be drawn up over the next year. Most certainly, geographers and economists are already involved in research that is highly relevant. Political scientists, social architects, lawyers, and political philosophers should recognize the opportunities for them to make central contributions. Psychologists and communication experts have already begun to formulate the challenges they face on this front (Zussman 1986). Students of business have done relevant work on the "social marketing" of public causes (Ahmed 1986). Others may need some time to ascertain ways in which they could contribute best but it will soon be obvious that *all forms of knowledge* have a contribution to make to self-understanding, to the understanding of human behaviour (i.e. to a fitting model of man), and to the understanding of the interface between development and environment.

Global changes to the planet are often the result of unintended consequences. Adaptation to such changes will not proceed ideally if we allow received patterns of myopic decisions to operate unmodified. Trying to understand better those planetary changes, to design better ways to co-ordinate human activities in their reactions to them, and to channel them in less destructive directions—such is the challenge that coping with global change raises for research and action by humanists and social scientists.

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LIST OF PERSONS IN ATTENDANCE AT THE 4 JUNE 1987 WORKSHOP

Gérard Bélanger (Economics) Laval
Gérard Bouchard (History) UQAC
David Braybrooke (Philosophy & Political Science) Dalhousie
Ian Burton (Environmental Studies) Toronto
Philippe Crabbé (Economics) Ottawa
Arthur G. Darnley (Geochemistry) Geol. Survey of Canada
Alex T. Davidson (Environmental Program) IRPP
Michael R. Dence (Geology) RSC
William S. Fyfe (Geochemistry) Western Ontario
John G. Fyles (Geology) Geol. Survey of Canada
Ralph Garber (Social Work) Toronto
David Gauthier (Philosophy) Pittsburgh
Walter A. Glooschenko (Aquatic ecology) Nat. Water Res. Inst.
Lorne Gold (Glaciology) NRC
Larry Haworth (Philosophy) Waterloo
John W. Holmes (Intern. Affairs) CIIA
Nicola Hubbard (Archeology) Saint Mary's University
John D. Jacobs (Geography) Windsor
Roger H. King (Geography) Western Ontario
Arthur Kroker (Political Science) Concordia
Barbara I. Kronberg (Geochemistry) Lakehead
Jacques Légaré (Demography) Montréal
William Leiss (Communications) Simon Fraser University
Laurie Ludlow (Geography) Guelph
Kevin Marron (Journalism) *Globe and Mail*
Charles B. Martin (Philosophy) Calgary
Digby McLaren (Geology) RSC
Harold Mooney (Biology) Stanford
Ward Neall (Geology) Memorial
Gilles Paquet (Economics & Administration) Ottawa
Bernard R. Pelletier (Geology) Geol. Surv. of Canada
Joseph Pestieau (Philosophy) Montréal
André Raynauld (Economics) Montréal

Robert Rogerson (Geography) Memorial
E. Fred Roots (Env. Sciences) Dept. of Env. (Ottawa)
Anthony D. Scott (Economics) UBC
Dan A. Seni (Social Forecasting) GAMMA Institute
Charles Smith (Geology) RSC
Darko R. Suvin (Comparative Literature) McGill
Glen Taylor (Administrative Studies) York
Donald F. Theall (Communications) Trent
Peter Timmerman (Philosophy) Toronto
Kimon Valaskakis (Economics) Montréal & GAMMA
Anne T. Whyte (Geography & Psychology) IDRC
Harold Williams (Earth Sciences) Memorial
David M. Winch (Economics) McMaster

PERSONS INVITED TO THE JUNE 4 WORKSHOP WHO COULD NOT BE THERE FOR REASONS BEYOND THEIR CONTROL AND SENT REGRETS

Alan F.G. Artibise (Urban Studies) Winnipeg
Michel Chevalier (Environmental Sciences) York
Pierre Dansereau (Ecology) UQAM
Gordon Fearn (Sociology & Urban Studies) Alberta
William Taylor (Anthropology) SSHRCC
Lionel Vallée (Intern. Dev. & Anthropology) Montréal

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